OFFICIAL PROGRAM

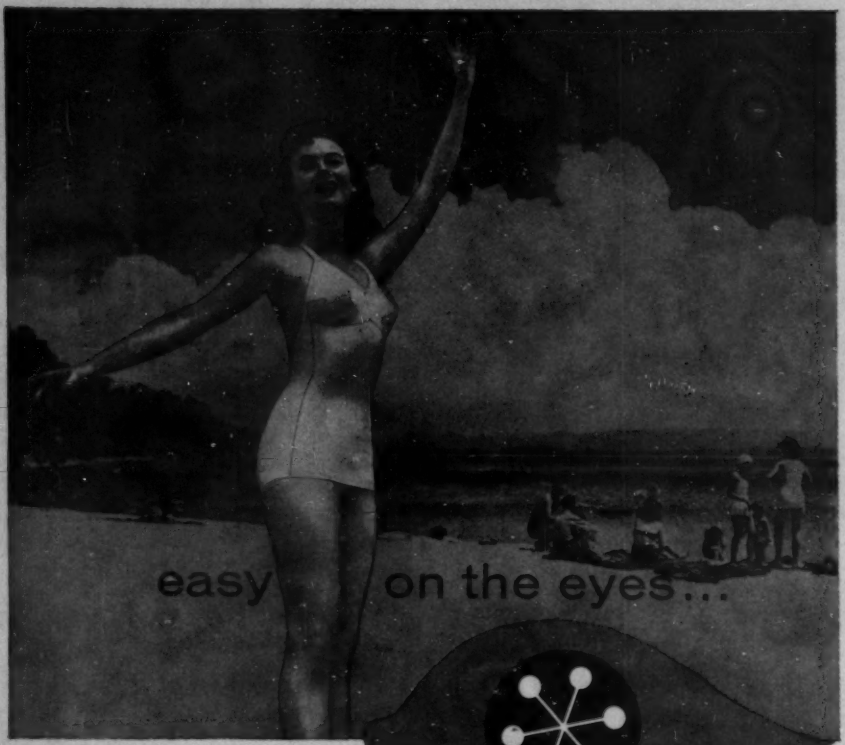
TRANSACTIONS

AMERICAN ACADEMY
of
OPHTHALMOLOGY
and
OTOLARYNGOLOGY

JULY-AUGUST
1959

Volume 63 No. 4

ANNUAL MEETING, OCTOBER 11-16, 1959, CHICAGO



OpH® EYE DROPS

Sterile buffered solution for minor eye irritations

decongestant • astringent • antiseptic

OpH contains:

- **Neo-Synephrine® HCl (0.08%)**—gentle, long acting decongestant
- **Zinc sulfate (0.06%)**—mild astringent and antiseptic
- **Boric acid (2.2%)**—standard ophthalmic bacteriostatic and mild antiseptic
- **Zephiran® chloride (1:7500)**—well tolerated, efficient antiseptic and preservative

Winthrop LABORATORIES New York 18, N. Y.

OpH, Neo-Synephrine (brand of phenylephrine) and Zephiran (brand of benzalkonium, as chloride, refined), trademarks reg. U.S. Pat. Off.
*Mono-Drop, trademark.

In exclusive Mono-Drop® bottles that eliminate dropper contamination and simplify instillation. 15 cc.

TRANSACTIONS

American Academy of Ophthalmology and Otolaryngology

VOLUME 63 JULY - AUGUST, 1959 NUMBER 4

TABLE OF CONTENTS

PAGE

SYMPOSIUM: OCULAR EFFECTS OF IONIZING RADIATION AND RADIOTHERAPY

BASIC CONCEPTS: ORIENTATION 429
DAVID G. COGAN, M.D.

BIOLOGIC EFFECTS OF RADIATION AND A DISCUSSION OF RADIOLOGICAL UNITS 433
TITUS C. EVANS, PH.D.

EARLY LENTICULAR LESIONS RESULTING FROM IONIZING RADIATION 439
LUDWIG VON SALLMANN, M.D.

RADIOTHERAPY OF LESIONS OF THE ORBIT AND OCULAR ADNEXA 449
MILFORD D. SCHULZ, M.D.

RADIOTHERAPY OF OCULAR LESIONS BY X-RAYS AND GAMMA RAYS 455
ARNOLD W. FORREST, M.D.

OCULAR THERAPY WITH BETA PARTICLES 468
JAMES E. MCDONALD, M.D.
FRED M. WILSON, M.D.

RADIOTHERAPY COMPARED TO OTHER FORMS OF OCULAR THERAPY 486
WILLIAM F. HUGHES, M.D.

DISCUSSION 497

THE CORRECTION OF NASAL SKELETAL DEFECTS 501
EDGAR M. HOLMES, M.D.

EDITORIALS

CLINICS IN MEXICO 533

LETTER TO THE EDITOR 536

(Continued on Next Page)

Printed bimonthly, February, April, June, August, October and December, by the Douglas Printing Company, 109 North 18th Street, Omaha 2, Nebraska, for the American Academy of Ophthalmology and Otolaryngology. Editorial and business office, 15 Second Street S.W., Rochester, Minnesota. Subscription price $10.00 yearly. Second class postage paid at Omaha, Nebraska.

TABLE OF CONTENTS *(Continued)*

PAGE

An Important Message . . . A.A.O.O. Members' Professional Liability Insurance Program 537

FINANCIAL REPORT: ANNUAL AUDIT, CALENDAR YEAR 1958. 540

New Artificial Larynx 548

SIXTY-FOURTH ANNUAL MEETING

Official Notices 551
Convention Activities 556
Candidates 558
Program in Brief 564
Scientific Sections 566
Special Scientific Programs 585
Scientific Exhibits 588
Technical Exhibitors 594

Technical Exhibits XXXVII

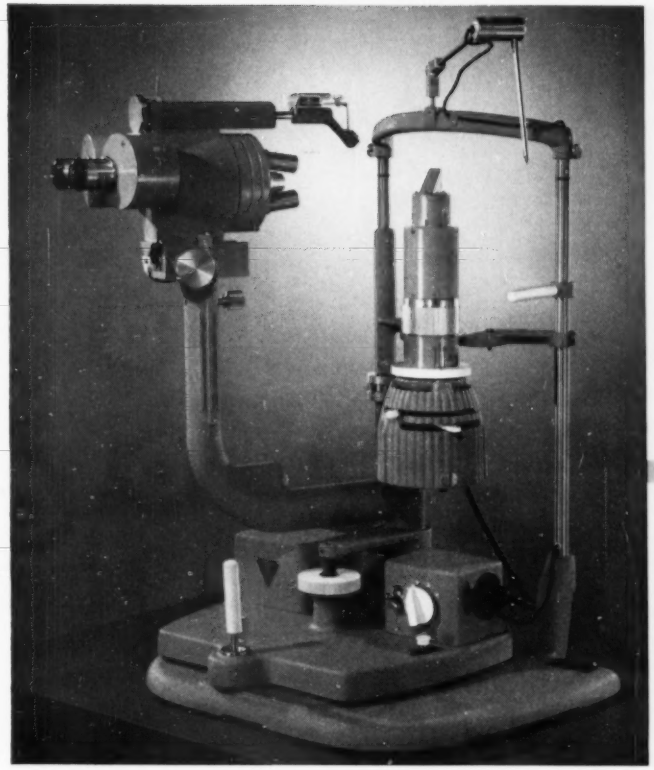
Section on Instruction LII

Award to Dr. Wendell Hughes LXVI

News Notes LXVIII

Positions Available LXXII

True complement to your professional skill



NEW FRONTIERS IN BIOMICROSCOPY

Thorpe Slit Lamp

All the features of the Bausch & Lomb Thorpe Slit Lamp serve to speed and clarify diagnosis. Sensitive controls and "click-set" adjustments are combined in such ways as to synchronize focus of microscope and slit for precise advantage. It is an instrument second to none in optical quality, in illumination, in smooth-as-silk mechanical operation. For literature or a demonstration, contact your authorized B&L ophthalmic instrument dealer, or write: Bausch & Lomb Optical Co., Dept. F-073, Rochester 2, New York.

Instrumentation by BAUSCH & LOMB SINCE 1853

JUST AS A REMINDER

4 E.N.T. products to remember!

AURALGAN®
EAR DROPS

IN ACUTE OTITIS MEDIA
SAFE AURALGESIC
AND DECONGESTANT

O-TOS-MO-SAN®
BACTERICIDAL - FUNGICIDAL

BROAD-SPECTRUM
THERAPY WITHOUT
ANTIBIOTICS

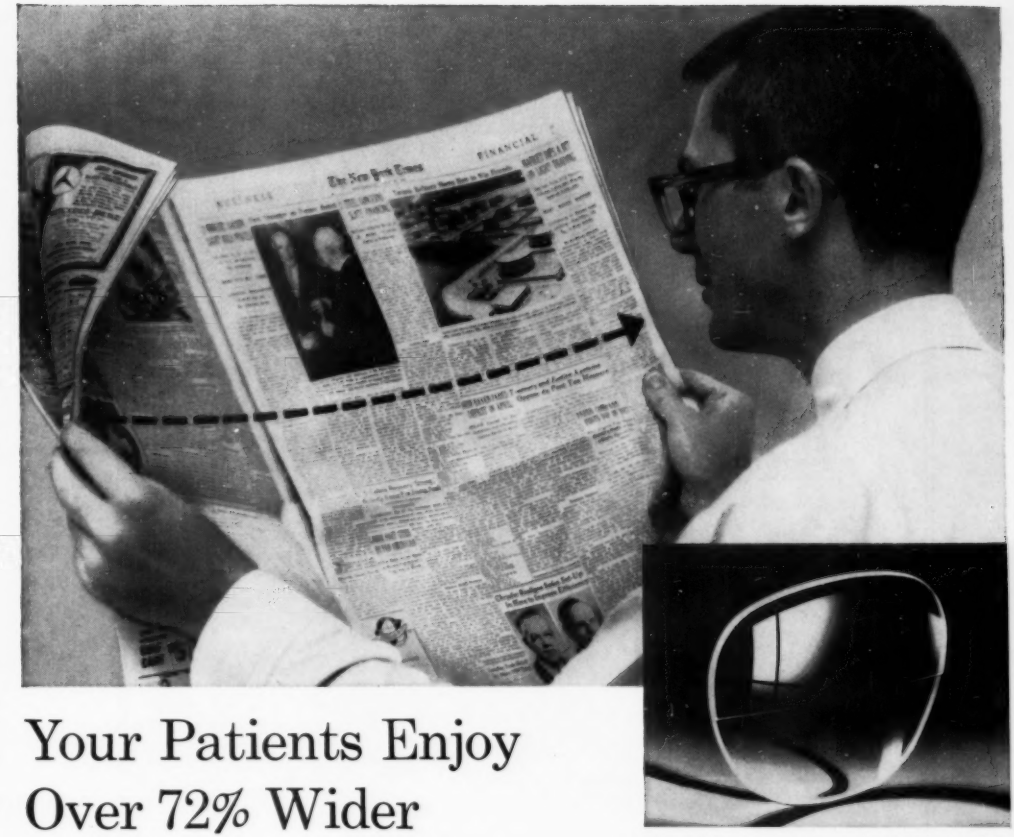
RHINALGAN®
NASAL SPRAY

SAFE!
"NOT JUST ANOTHER
DECONGESTANT"

LARYLGAN®
THROAT SPRAY - GARGLE - SWAB

FOR INFECTIOUS
AND NON-INFECTIOUS
THROAT INVOLVEMENTS

DOHO CHEMICAL CORP., 100 VARICK ST., NEW YORK 13, N.Y.



Your Patients Enjoy Over 72% Wider Fields of View with Tillyer Executive Lenses

The Tillyer Executive: Available in Bifocal, Double Segment and Trifocal types. Most types available in shades for outdoor wear, so recommend that your patients "Add a Pair for Outdoor Wear."

Near-vision tasks are easier with Tillyer Executive Multifocals because no other lens offers as wide a field of view. For example:

At 16 inches from eye to printed page, a patient, without moving his head, can clearly read a 25.7" span using a 46mm wide Tillyer Executive bifocal.*

At the same distance, and under the same conditions, a patient can clearly read only within a 14.9" span using the largest fused-type bifocal now available—a conventional 28mm straight-top design.*

The Executive is the ideal multifocal lens, especially for first time wearers. There is no image jump, no segment hunting. The Tillyer Principle gives maximum marginal correction, and the wide-reading segment provides exceptional flexibility in fitting. For patient comfort, prescribe the Tillyer Executive . . . available through your AO Franchised Distributor or local AO Branch.

**Approximate measurements for plano distance prescriptions with +2.00 adds at typical pupil and fitting distance.*

American Optical
COMPANY

Since 1833 ... Better Vision for Better Living

The

Monel Metal

RADIUM Applicator

Used for nearly 20 years

in the treatment of hyperplastic tissue,

which cannot be surgically removed,

at the Eustachian orifice

or the fossa of Rosenmueller.

Available through purchase

or annual lease at a reasonable

monthly rental.

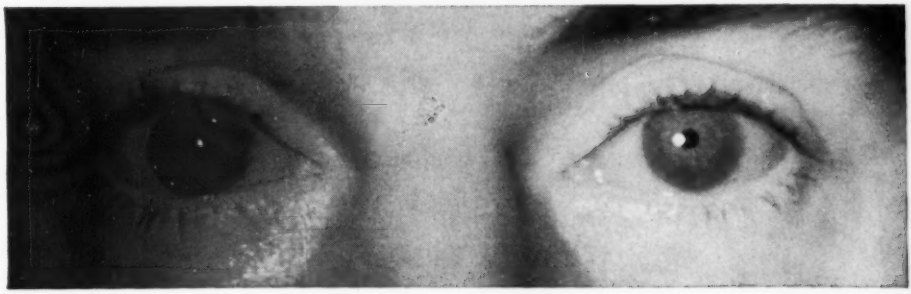
Write for details

RADIUM CHEMICAL CO., INC.

161 East 42nd St., New York 17, N. Y.

SERVING THE MEDICAL PROFESSION FOR MORE THAN 45 YEARS

Progress in the treatment of glaucoma



ISOPTO® CARBACHOL

carbachol with methylcellulose
STERILE OPHTHALMIC SOLUTION

Isopto Carbachol is a nonirritating solution that has been shown to be as effective as carbachol solutions containing higher concentrations of surface active agents.[1] More active than pilocarpine, Isopto Carbachol produces a greater degree of miosis and requires fewer applications.

ISOPTO® P-ES

pilocarpine HCl, eserine salicylate and methylcellulose
STERILE OPHTHALMIC SOLUTION

A comfortable, isotonic solution of pilocarpine HCl 2% and eserine salicylate 0.25% with 0.5% methylcellulose for prolonged contact.

A complete line of sterile ophthalmic solutions for glaucoma therapy:

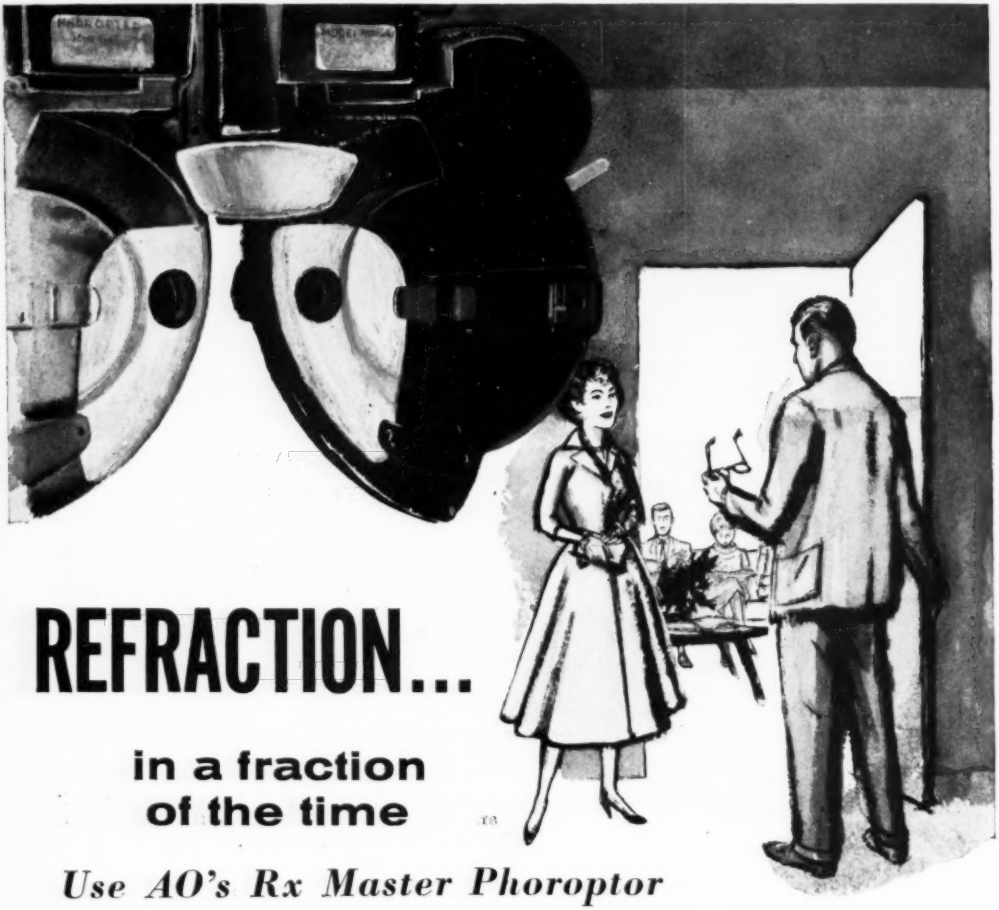
ISOPTO CARBACHOL	carbachol with methylcellulose	0.75% 1.5% 3%
ISOPTO® CARPINE	pilocarpine HCl with methylcellulose	0.25% 0.5% 1% 2% 3% 4%
ISOPTO® ESERINE	eserine salicylate with methylcellulose	0.25% 0.5%
ISOPTO P-ES	pilocarpine HCl 2%, eserine salicylate 0.25% with methylcellulose	

All Alcon miotics are supplied in the 15 cc. Drop-Tainer®.

Alcon **miotics** have **green** caps and dropper tips.
Alcon **mydriatics** have **red** caps and dropper tips.

[1] Alcon Research Report No. 9

Alcon ALCON LABORATORIES, INC., Fort Worth, Texas



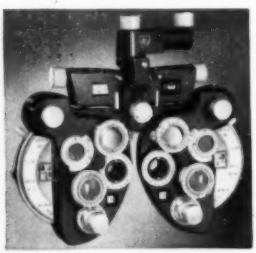
REFRACTION...

in a fraction of the time

Use AO's Rx Master Phoroptor

For Accuracy and Convenience

AO's Rx Master Phoroptor answers the problem you face every professional day—how to handle as many patients as possible and yet give each individual the very best attention possible.



The Rx Master is quick and accurate, allows you to work fast without hurrying the patients. Its modern, precise appearance reflects your own thorough, exacting professional standards.

With Ful-Vue Vergence, your patients always look *directly* through the system "on center" . . . no oblique viewing or partially overlapping fields. You'll appreciate the automatic pickup of sphere power from one dial . . . as well as automatic pickup of cylinder power to 6.00 D from just one control.

Rugged, washable Roto-Chart provides you with twelve near point tests . . . dialed simply into position. And AO's Tri-Loupe turret features all three loupes in a single plane close to the main viewing apertures, which results in short total optical path and widest field of view.

Finished in jade green, coral, ivory tan or black, the Rx Master is a striking addition to your examining room decor.

Ask your Sales Representative for a demonstration or write

American Optical
COMPANY

INSTRUMENT DIVISION, BUFFALO 15, NEW YORK

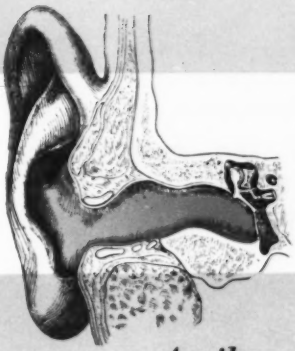
Antibacterial / Anti-inflammatory

'CORTISPORIN'® OTIC DROPS

- Relieves "incessant itching" and inflammation
- Eradicates *Pseudomonas* and other common causes of otitis
- Helps restore normal acid mantle
- ***Rarely sensitizes***

Contains: 'Aerosporin'® brand Polymyxin B Sulfate, Neomycin Sulfate, and Hydrocortisone (free alcohol) in a sterile, slightly acid, aqueous suspension.

Available in dropper bottles of 5 cc.



for infected and inflamed ears

Antibacterial / Antifungal

'AEROSPORIN'® OTIC SOLUTION

- Counteracts "sogginess" of ear canal
- Eradicates *Pseudomonas* and other common causes of otitis
- Hygroscopic
- Antifungal for *Monilia* and *Aspergillus*
- Helps restore normal acid mantle
- ***Rarely sensitizes***

May be used prophylactically in patients with recurring "swimmer's ear."

Contains: 'Aerosporin'® brand Polymyxin B Sulfate in Propylene Glycol with 1% Acetic Acid. Sterile.

Available in dropper bottles of 10 cc.

BURROUGHS WELLCOME & CO. (U.S.A.) INC., Tuckahoe, New York

3 ophthalmic products with **distinctive advantages...**

- their wide-spectrum bactericidal activity includes *ALL clinically isolated strains of Pseudomonas aeruginosa.* a serious invader noted for the rapidity of its destructive powers.
- their component antibiotics rarely sensitize.

'NEOSPORIN'®

brand Polymyxin B-Gramicidin-Neomycin

ANTIBIOTIC OPHTHALMIC SOLUTION

Available in bottles of 10 cc. with sterile dropper.

'NEOSPORIN'®

brand Polymyxin B-Bacitracin-Neomycin

ANTIBIOTIC OINTMENT

Available in ⅛ oz. ophthalmic tubes.

'CORTISPORIN'®

brand Polymyxin B-Bacitracin-Neomycin with 1% Hydrocortisone

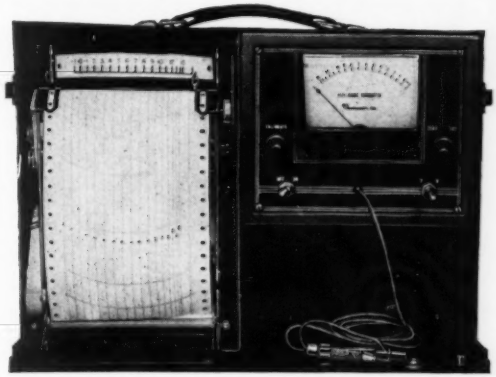
ANTIBIOTIC OINTMENT

Available in ⅛ oz. ophthalmic tubes.

BURROUGHS WELLCOME & CO. (U.S.A.) INC., Tuckahoe, New York

From V. Mueller . . .

The only complete tonography unit



Electronic Tonometer and Recording Device combined in a single portable unit . . . developed and built exclusively by V. Mueller

This portable Tonography Unit brings a long-needed, major contribution to modern tonographic research. The Tonometer is greatly improved, more rugged, less subject to interference, and easier to read. Specially adapted, large graph recording device.

OP-9050 Mueller Electronic Tonographer TR. For 110 volts, 60 cycles, AC. **Each, $895.00**

Also Available:

OP-9040 Mueller Electronic Tonometer, only. All new, improved Model MC. **Each, $350.00**

OP-9060 Mueller Recording Unit, only. Adaptable to any electronic Tonometer. **Each, $475.00**

Write for illustrated descriptive folder today

V MUELLER & CO.

Fine Surgical Instruments and Hospital Equipment

330 South Honore Street • **Chicago 12, Illinois**

DALLAS • HOUSTON • LOS ANGELES • ROCHESTER, MINN.

Armamentarium

rapid onset–prolonged duration in all local anesthetic procedures

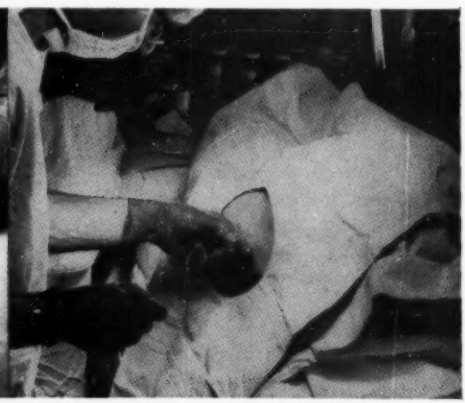
CYCLAINE® Hydrochloride

(HEXYLCAINE HYDROCHLORIDE)

SURFACE ANESTHESIA "CYCLAINE combines a greater spectrum of useful local anesthetic activity with a greater margin of safety. It is as active for surface anesthesia as for block and infiltration anesthesia."[1] Supplied as 5% topical solution and 5% jelly.

INFILTRATION AND MINOR BLOCK ANESTHESIA CYCLAINE is faster and longer acting than procaine in the same concentration. "Experience . . . impresses one with its almost immediate onset, excellent spreading factor and depth of anesthesia."[2] Supplied as 1% injection.

CAUDAL AND LUMBAR EPIDURAL ANESTHESIA CYCLAINE is the drug of choice for epidural anesthesia because of ". . . lack of clinical toxicity . . . rapid onset . . . profound anesthesia similar in all respects to spinal anesthesia . . . high percentage of successful blocks (98.5 per cent)..."[3] Supplied as 2% injection.



SPINAL ANESTHESIA "It has proved to be the best of all drugs used in this series [of obstetrical cases delivered by low spinal anesthesia] . . . We were particularly impressed by the large percentage of patients in whom there was no appreciable lowering of blood pressure."[4] Supplied as 2.5% injection with 10% dextrose.

references: 1. Current Researches in Anesth. & Analges. 33:275, July-August 1954. 2. J. Urol. 72:266, August 1954. 3. Anesthesiology 16:386, May 1955. 4. Western J. Surg., Gynec. & Obst. 59:533, October 1951.

MSD MERCK SHARP & DOHME DIVISION OF MERCK & CO., INC., PHILADELPHIA 1, PA. CYCLAINE is a trademark of Merck & Co., Inc.

for anesthesia in quietness and confidence

VINETHENE®

VINYL ETHER FOR ANESTHESIA, U.S.P.

induction prior to ether—VINETHENE "... is more rapid and smooth than nitrous oxide and the excitement period is practically eliminated."[1] May be administered with closed technic.

short operative procedures—VINETHENE is easily administered by open-drop method. Induction and recovery are pleasant and rapid, muscular relaxation is good, and excitement or nausea is rarely observed.

supplement to nitrous oxide or ethylene—VINETHENE with ethylene-oxygen or nitrous oxide-oxygen complements these drugs and permits utilization of more oxygen. Ideal for brief surgical procedures.

1. Goodman, L. S., and Gilman, A.: The Pharmacological Basis of Therapeutics, ed. 2, New York, The Macmillan Company, 1955, p. 69.

supplied: In 10-cc., 25-cc., 50-cc., and 75-cc. bottles, each with adjustable plastic dropper cap.

MERCK SHARP & DOHME DIVISION OF MERCK & CO., INC., PHILADELPHIA 1, PA. VINETHENE is a trademark of Merck & Co., Inc.

storz
Surgical Instruments

. . . . . New York Showroom . . . . .

Moved to

157 East 64th Street - *At Lexington Ave.*

New York City

Manager: Mr. Gil Weatherly

Have outdoor glasses... will travel!

**Are your patients visually equipped for modern living?*

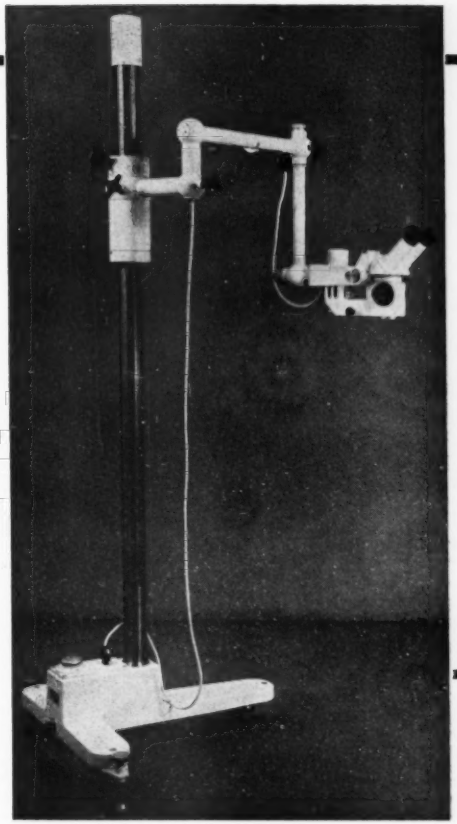
BENSON OPTICAL COMPANY

Executive Offices • Medical Arts Building, Minneapolis

specialists in prescription optics since 1913

COMPLETE LABORATORIES CONVENIENTLY LOCATED IN UPPER MIDWEST CITIES

storz
Surgical Instruments



K 994

Can be used with any ZEISS Operating Microscope, OLD or NEW! NO MODIFICATION REQUIRED!

The **STORZ-ZEISS OPERATING MICROSCOPE** *with*

Footswitch *and* Transformer

in Separate

Explosion-Proof Housing

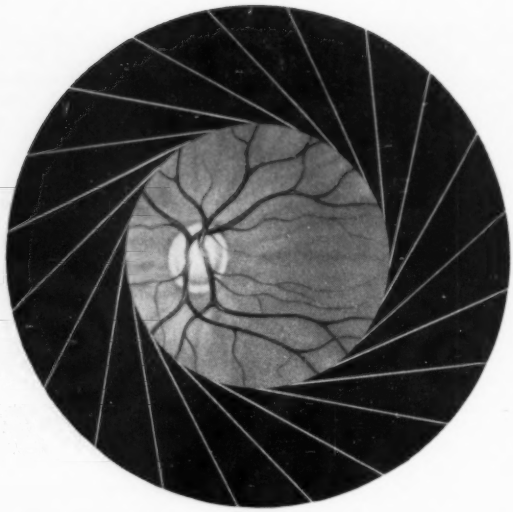
NO MODIFICATION REQUIRED

The separate EXPLOSION PROOF UNIT is plugged into wall outlet and connected to light bulb plugs. Standard non-explosion proof base of microscope is by-passed and undisturbed, thereby making it available for photographic procedures or as a stand-by power source.

Storz Instrument Company

4570 Audubon Avenue ● St. Louis 10, Missouri

New York Showroom: 157 E. 64th St., at Lexington



NOW...DISTINCT FUNDUSCOPIC OBSERVATIONS
CYCLOMYDRIL™...FOR MYDRIASIS
FAST...PROFOUND...WITHOUT CYCLOPLEGIA

Funduscopic examination is easier and more accurate — therapeutic mydriasis more profound and thereby more effective — through the use of New CYCLOMYDRIL.™ Even in the most darkly pigmented iris, a dramatic pupillary dilation begins upon instillation. This profound mydriasis is resistant to bright light *but readily reversible in 30 minutes with a miotic.*

Mean Increase in Pupil Size 30 Minutes after Instillation[1]

brown or hazel eyes	3.15 mm.
dark brown (Negro) eyes	3.50 mm.
blue, gray or green eyes	4.38 mm.

The combined action of phenylephrine—an adrenergic mydriatic of choice[2] and Cyclogyl®—the potent anticholinergic mydriatic (in a concentration without cycloplegic effects) produces a pupillary dilation greater than that obtained by either drug alone. Cyclomydril is safe—there is no significant change in ocular tension or other serious side effects.

Indications and Dosage: In funduscopy—one drop in each eye.
In treatment of iritis, iridocyclitis, keratitis, choroiditis, posterior synechiae, ocular trauma and after removal of cataracts or other ocular surgery—one drop every 6-8 hours.
May be used for refraction in certain patients who have little or no accommodation. (Cyclogyl® is required when both cycloplegia and mydriasis are indicated.)

Composition: Cyclogyl® (cyclopentolate hydrochloride) 0.2%, phenylephrine hydrochloride 1.0% with PVP (polyvinylpyrrolidone) in a sterile, buffered ophthalmic solution. Available in 2 ml. and 7.5 ml. dropper bottles.

Samples and literature available on request.

1. Priestly, B. S.; Medici, M. M., and Phillips, C. C. To be published. 2. Ablquist, R. P. in Drill, V. A. Pharmacology in Medicine, McGraw-Hill Book Company, Inc. New York, 1954, p. 18-26.

Schieffelin & Co. / Since 1794

CYCLOMYDRIL™

The Traveling Man from Mager & Gougelman

Eddie Kerr has helped physicians fit thousands of patients with artificial eyes. Like the other experts from our offices, he provides you with technical information and assistance on difficult cases. The samples in his case will match many patients. Or, he can make eyes that perfectly match with the materials he carries. One of our experienced men visits most areas regularly—another reason to call or write our nearest office for your next ocular prosthesis.

Complete Artificial Eye Service

- **Eyes custom made—glass or plastic**
- **Eyes from stock sent on same day order received—glass or plastic**
- **Damaged or broken eyes accurately matched**
- **Fitted to all types of motility implants**
- **Implants, X-Ray therapy shields, foreign body locators**
- **Superior Quality—Finest Workmanship**

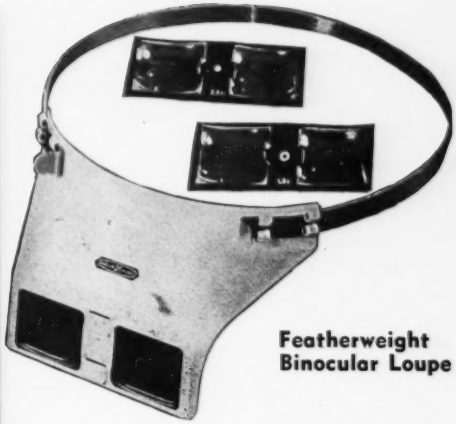
Mager and Gougelman inc.

Serving the Profession Since 1851

30 N. Michigan Ave. Chicago 2, Illinois

120 E. 56th St. New York 22, N. Y.

CLEVELAND DETROIT HOUSTON (Soper Bros.)
KANSAS CITY MINNEAPOLIS ST. LOUIS
BOSTON PHILADELPHIA PITTSBURGH WASHINGTON



Featherweight Binocular Loupe

Permits interchange of higher or lower power lens mountings. Designed to give complete comfort when wearing glasses. Can be sterilized without harm. Now available with choice of 1½×, 2× or 2½×. **$15** P.P. Additional powers **$6** pr. ppd.

BARNETT Optical Laboratories
3120 North Cicero Ave., CHICAGO 41, ILL.

URGENT REQUEST

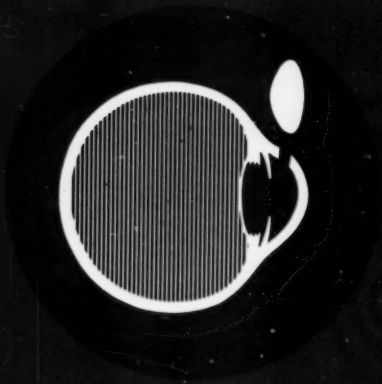
The Uveitis Laboratory, University of California School of Medicine, San Francisco, is interested to obtain freshly enucleated eyes from patients with **all types of uveitis** and other endogenous inflammations. Attempts are being made to isolate etiologic agents from these eyes.

The eyes should **not** be fixed in preservatives or frozen, but placed in a sterile bottle, packaged, and shipped as quickly as possible. Please send specimens air express, special delivery, **collect.** Enclose history and findings, and mark the package "Fresh Tissue Specimen—Rush."

A report of isolations of organisms and pathologic findings, including a slide, will be sent to the contributor. Credit will be given in any resulting publications, if desired.

Telegraph collect if specimen is being sent. Send eyes to . . .

Samuel Kimura, M.D.,
Michael J. Hogan, M.D., or
Phillips Thygeson, M.D.
University of California School of Medicine, San Francisco 22



NEW

for

enzymatic

zonulysis...

from the ophthalmic

research

laboratories

of Alcon

ZOLYSE™

alpha-chymotrypsin with BALANCED SALT SOLUTION, ALCON

in CATARACT SURGERY

ZOLYSE (alpha-chymotrypsin with BALANCED SALT SOLUTION, ALCON) selectively lyses the zonules, facilitates delivery of the lens and minimizes such dangers as capsular rupture, loss of vitreous, traumatic iridocyclitis and detachment of the retina.

The BALANCED SALT SOLUTION, ALCON, which is furnished as a diluent and for lavage purposes, "offers less cytotoxic effect to the intraocular tissues than does normal saline diluent."[1] "It has been recently demonstrated that frequent irrigation with saline results in swelling of the corneal stroma from alteration of the mucopolysaccharides of the cornea."[2]

ZOLYSE reduces operative and post-operative complications.

ZOLYSE is safe with no known contraindications in patients over 20.

Each ZOLYSE unit contains one vial of 750 units of lyophilized alpha-chymotrypsin and one 10 cc vial of BALANCED SALT SOLUTION, ALCON, as the diluent and for irrigating the eye .

[1]Girard, Louis J., and Neely, Wanda: "The Evaluation of Zolyse in Cataract Extraction", Research Report No. 11, Alcon Laboratories, Inc., 1959.

[2]Boyd, Benjamin F.: Enzymatic Zonulysis, Highlights of Ophth., vol. III, no. 4, pg. 70, 1959.

Alcon ALCON LABORATORIES, Inc.
FORT WORTH, TEXAS

NEW Knowledge for the OPHTHALMOLOGIST

√ FRESH Procedures *√ TESTED Applications*

● **THE EYE: A Clinical and Basic Science Book** by **E. Howard Bedrossian, Univ. Pennsylvania.** A tested collection of useful, up-to-date information arranged for easy, quick consultation in three sections: 1) Clinical Section; 2) Ocular Emergencies Section; 3) Basic Science Section. Pub. Oct. '58, 352 pp., 52 il. (two pages of four-color process), $11.00

● **SURGERY OF THE EYE: INJURIES** by **Alston Callahan, Birmingham, Alabama.** "He has given a lucid description of the methods which he has found best suited for individual cases. The photography and colored sketches leave nothing to be desired. The author is to be congratulated for his keen powers of discrimination and his valuable contribution to the field of ophthalmology."—Southern Medical Journal. Pub. '50, 240 pages (8½x11), 367 illustrations (15 plates in full color), $12.50

SURGERY OF THE EYE: DISEASES by **Alston Callahan.** All surgical problems of the eye, lid and orbit resulting from diseases and congenital anomalies are considered. This companion volume rounds out the subject for complete coverage of eye surgery. Pub. '56, 452 pp. (8½x11), 589 il. (19 in color), $25.00

Publishing Books and Monographs Is Our Business

NEUROLOGY OF THE OCULAR MUSCLES by **David G. Cogan, Harvard Med. School.** "It is certain that this monograph will continue to hold an eminent position in neuro-ophthalmology. It is unique, complete, and authoritative. Every ophthalmologist should have it in his working library."—Survey of Ophthalmology. 2nd Ed. pub. '56, 320 pp., 166 il. (2 in color), $8.50

● **PRINCIPLES OF OPHTHALMOLOGY** by **John K. Erbaugh, Norristown State Hosp., Norristown, Pa.** A practical, easy-to-follow manual designed to aid not only in the diagnosis but in the manner of treatment and follow-up in some diseases. Descriptive material kept on a level requiring the barest minimum of the busy physician's time if he finds it desirable to re-read. Pub. '57, 80 pp., 9 il., 22 full-color plates, $5.50

● **A SYSTEM OF OPHTHALMIC ILLUSTRATION** by **Peter Hansell, Univ. of London.** Brings into sharp focus features like these: Guiding principles in selecting equipment for ophthalmic photography; Detailed treatment of motion picture photography; Gross specimens and special preparations; General organization of an illustration department, including indexing and filing of records; The role of the artist in the field. Pub. '57, 128 pp., 128 il. (5 color plates), (Amer. Lec. Medical Photography), $5.75

● **GEOGRAPHIC OPHTHALMOLOGY: Asia, Australia, and Africa** by **William John Holmes, St. Francis Hosp., Honolulu.** Fresh, thought-provoking ideas for ophthalmic research by ophthalmologists and scholars dealing with common eye diseases in tropical, subtropical, and arid areas of the world. Pub. Jan. '59, 312 pp., 132 il., $8.50

● **LENS MATERIALS IN THE PREVENTION OF EYE INJURIES** by **Arthur Hail Keeney, University of Louisville, Kentucky.** "This is the readable story of man's effort to serve as his brother's keeper through the provision of suitable lens material in goggles."—Industrial Medicine and Surgery. Traces the development of protective lens materials from the earliest attempts to the final stages of today's mass production techniques. Pub. '57, 88 pp., 26 il. (Amer. Lec. Ophthalmology), $3.50

● **OUR BLIND CHILDREN: Growing and Learning with Them** by **Berthold Lowenfeld, Berkeley, California.** A straightforward, realistic, practical book covering all areas of learning and educational facilities. An informative Appendix lists periodicals, educational facilities, and organizations which serve blind children. Pub. '56, 224 pp., 8 il., $5.50

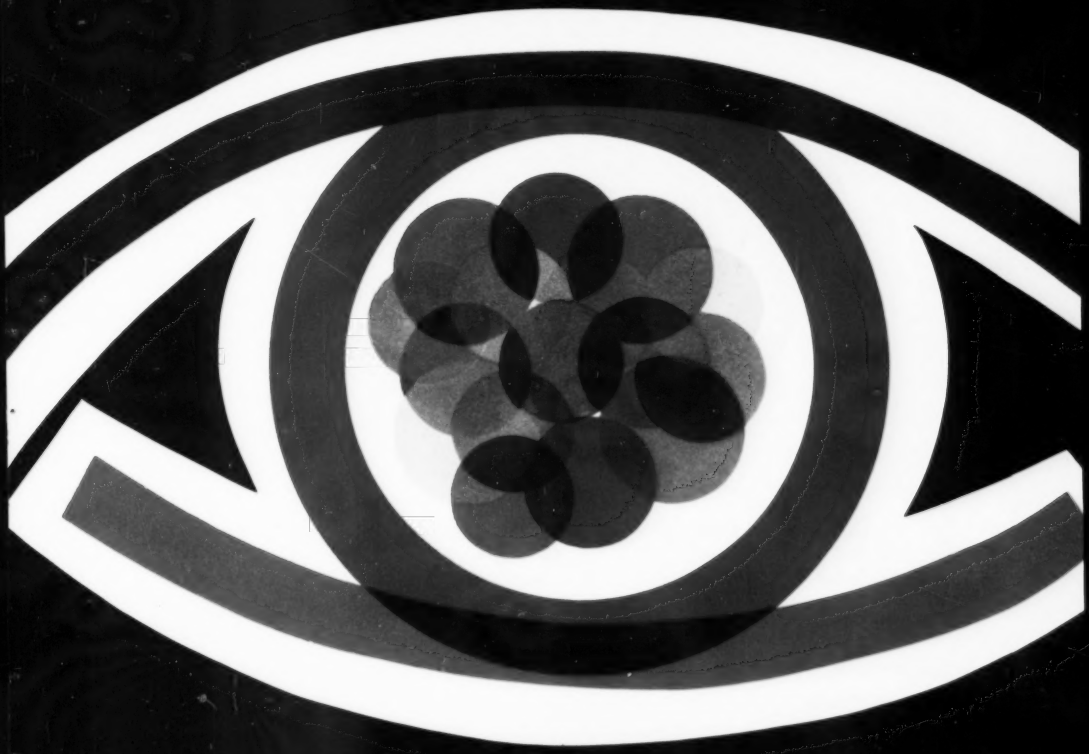
● **NEURO-OPHTHALMOLOGY** by **Donald J. Lyle, Univ. Cincinnati.** Deals with the relationship of the eye to the brain, presenting basic knowledge, newer clinical concepts, and more recent advances in investigation. "Dr. Lyle is by his training and special interest wonderfully qualified to do a work of this kind. This then, is the product of a master of the subject."—Cincinnati Journal of Medicine. 2nd Ed. pub. '54, 608 pp., 655 il. (20 in color), $17.50

● **COMPARATIVE ANATOMY OF THE EYE** by **Jack H. Prince, Univ. Hosp., Columbus, Ohio.** Written for the student so far as its simplicity is concerned and for the research graduate in the way available information is tabulated and laboratory methods explained, this book includes all the anatomical investigations made by the author and some by other experts. Features a section on comparative anatomy of the orbit which has not been dealt with to any extent previously. Pub. '56, 422 pp., 274 il. (7 in color), $8.50

● **THE DOCTOR EYES THE POOR READER** by **Delwyn G. Schubert, Los Angeles State College.** Here in concentrated capsule form is a great deal of practical advice for the ophthalmologist who wants to be of maximum assistance to disturbed parents and troubled educators. Rounds out the physician's understanding of the reading problem. Pub. '57, 116 pp., $3.75

● **THE CORNEA** by **Charles I Thomas, Western Reserve Univ.** "This is a monumental work and a very real contribution to ophthalmology. No one man, working for a whole lifetime on one subject, could possibly have had personal experience with all the phases of the subject which are expounded here, but the author has had the ability to bring existing knowledge together and organize it into a readable unit. The illustrations are superb, and an excellent bibliography follows each chapter."—Archives of Ophthalmology. Pub. '56, 1348 pp., 677 il. (22 in color), $30.00

CHARLES C THOMAS • PUBLISHER
301-327 East Lawrence Avenue
Springfield • Illinois



the important factors you look for in topical eye therapy

METIMYD

Ophthalmic Suspension

prednisolone acetate and sulfacetamide sodium

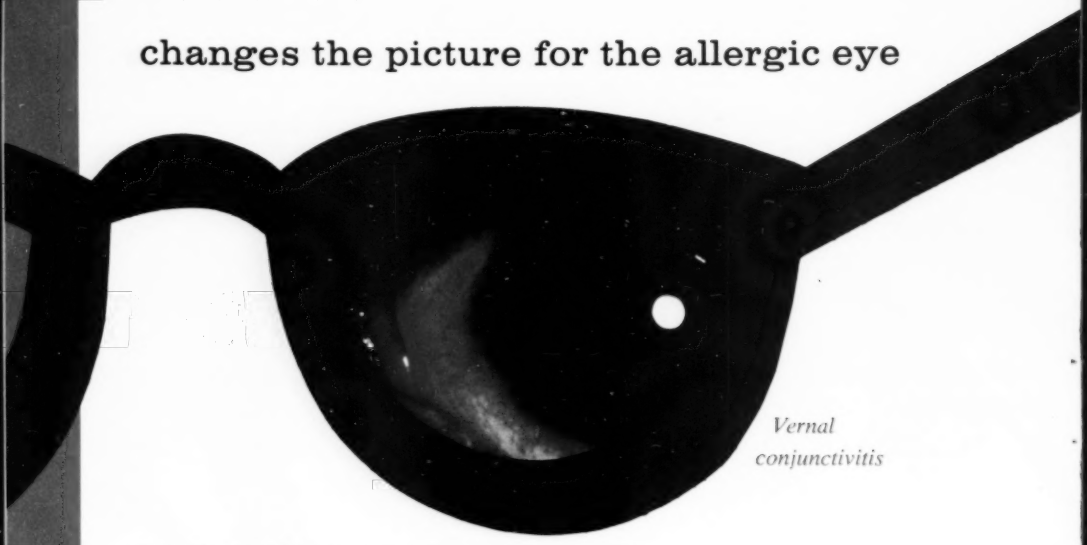
antibacterial
antiallergic
anti-inflammatory

Supplied: 5 cc. dropper bottle.

METIMYD,® brand of prednisolone acetate and sulfacetamide sodium.

Schering

changes the picture for the allergic eye



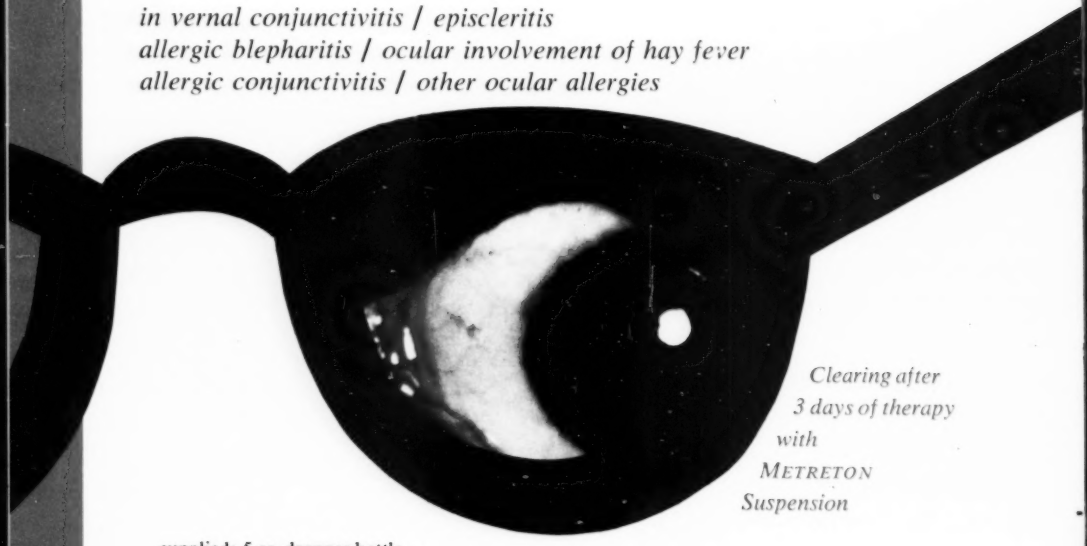
Vernal conjunctivitis

METRETON

Ophthalmic Suspension

combining METICORTELONE and CHLOR-TRIMETON

in vernal conjunctivitis / episcleritis
allergic blepharitis / ocular involvement of hay fever
allergic conjunctivitis / other ocular allergies



Clearing after 3 days of therapy with METRETON Suspension

supplied: 5 cc. dropper bottle.

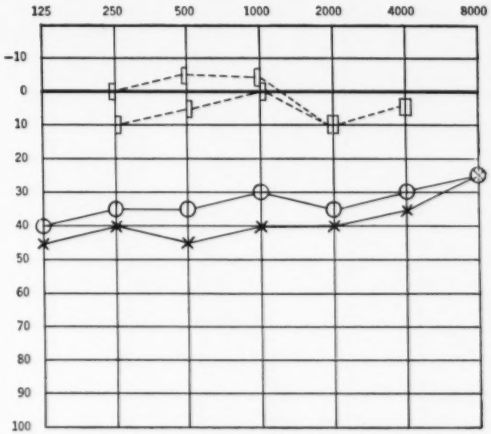
METRETON,® brand of corticoid-antihistamine compound.
METICORTELONE,® brand of prednisolone.
CHLOR-TRIMETON,® brand of chlorprophenpyridamine preparations.

Schering

SCHERING CORPORATION • BLOOMFIELD, NEW JERSEY

MS-J-119

Your Patient's Hearing Loss –and the Type Hearing Aid Needed!



If this were your patient's audiogram, which type of hearing aid would you recommend? It is taken from the case history of a 32-year-old bookkeeper whose hearing loss was diagnosed, at age 19, as otosclerosis, with little or no perceptive component. In consultation with his doctor, the patient decided against surgery.

Clinical findings: Ave. loss, R: 33 db, L: 42 db, B.B.A.: 33 db, SRT: 35 db, MCL: 55 db, TD: 100 db. Discrimination: L: 92%, R: 94%.

Prognosis: Patient should adapt readily to moderate gain hearing aid, air conduction type.

Recommendations: Any of these five Zenith Hearing Aids: Zenith "Citation" or "Challenger" Eyeglass Hearing Aid. At-the-Ear Zenith "Diplomat" with L-1 earphone, or "Ambassador." Moderate gain conventional Zenith Hearing Aid—"Crusader" model in "M" tone setting.

This report is but one of the many typical cases described in a helpful new book, prepared especially for the medical profession by the Hearing Aid Division of Zenith Radio Corporation.

Now available . . . a valuable reference book designed to help you recommend the right type of hearing aid for your patients. Besides the actual typical case history outlined above, Zenith's book, "Which Type Of Hearing Aid For Your Patient?", describes many other cases, and lists the appropriate Zenith Hearing Aid. Also contains a complete description of all types of Zenith Hearing Aids and their uses.

ZENITH

"LIVING SOUND"
HEARING AIDS

SEND FOR YOUR FREE COPY TODAY!

Zenith Radio Corporation, Hearing Aid Division,
6501 W. Grand Ave., Dept. 41V, Chicago 35, Ill.
Please send me at once a free copy of your new book, "Which Type Of Hearing Aid For Your Patient?" published by Zenith Radio Corporation.

NAME

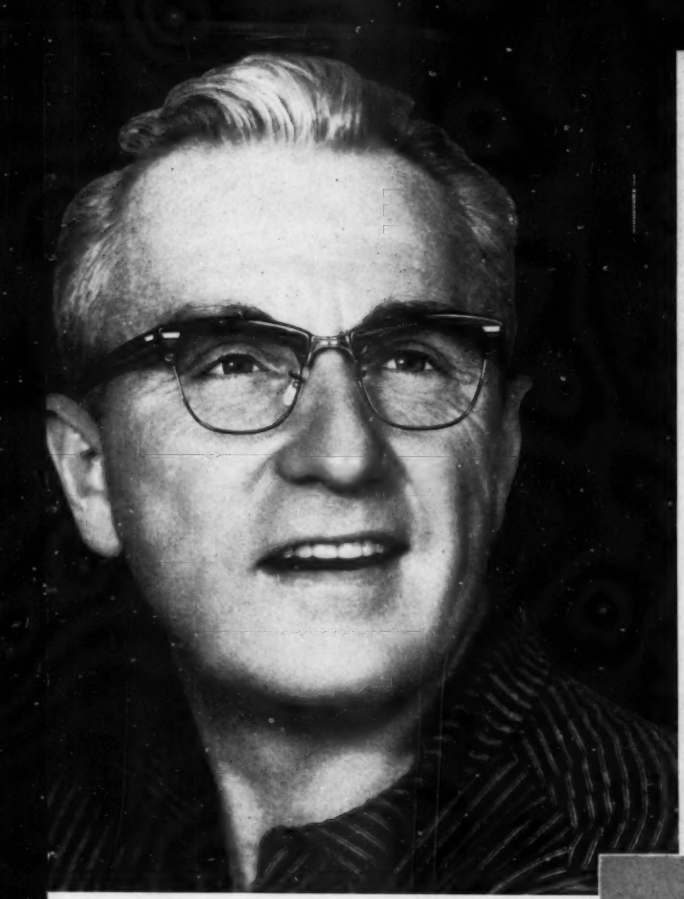
ADDRESS

CITY ZONE STATE

The Younglike **Rondon**

Browline® Frame

the all-new Shuron combination for younger men
—and men who want to look younger



In Black Briar
Golden Briar
Briar Grey
Cordova

44 to 48 (18-24)
50 (20-24)

Special Oxford Temple
from 5¼" to 6½" L.O.

Today, in their choice of cars, homes, and clothes... in the way they work, the way they play, *and the way they look*... men express the fresh, active, vitality of youth.

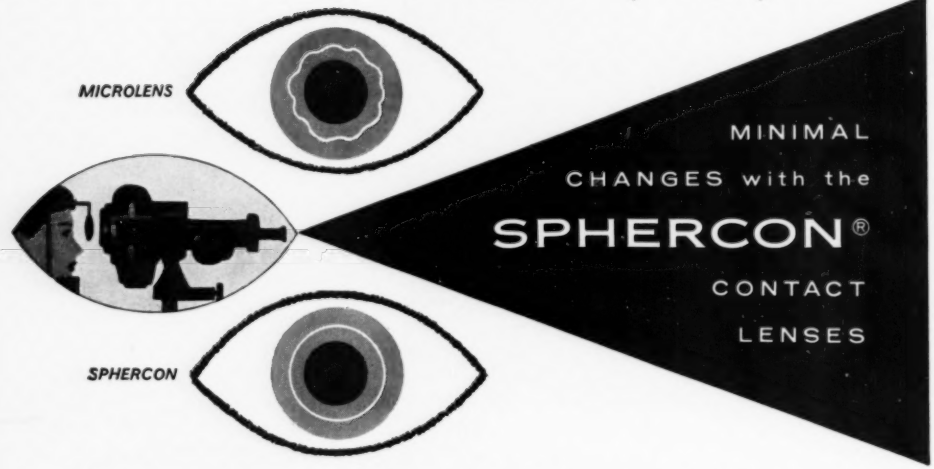
That is the spirit of Rondon... the dynamic new *younglike* styling that's in tune with the taste of today.

SHURON OPTICAL COMPANY
Rochester, N. Y. Geneva, N. Y.

SHURON®

COMPARISON CHART BETWEEN MICROLENSES—SPHERCONS®

Average dioptric change of flattest meridian of cornea after fitting.	.90 D	.02 D
Average dioptric change of steepest meridian of cornea after fitting.	.76 D	.12 D
Average dioptric change of both meridians of cornea combined after fitting.	.83 D	.08 D
Percentage of cases showing change in curvature of cornea more than error of measurement.		
A. Flattened	76%	5.2%
B. Steepened	17%	9.6%
Percentage of cases showing distortion of ophthalmometer mires after fitting	71%	11%



The Sphercon lens, as shown by the table, has minimized the problems of contact lens fitting. It is so constructed to offer minimal interference with corneal metabolism. With its small size, evaporation of fluids can take place easily and corneal temperature can be more normally maintained. The peripheral curve provides access of lacrimal secretion around or about the entire lens circumference, allowing for an adequate supply of surface nutrition and elimination of waste products.

The Sphercon contact lens does not interfere with the limbal vascular system or the aqueous veins. Its relative thinness minimizes pressure from the lid while the central base curve of the lens allows for more even distribution of pressure over a greater area of the fluid surface.

Write to Dept. F for the "Sphercon" Contact Lens Fitting Manual.

THE PLASTIC CONTACT LENS COMPANY
59 East Madison Street, Chicago 3, Illinois

Knowledge—Research—Development—for the contact lens field

new

OPHTHOCORT® IN EYE INFECTIONS

WIDER ANTIBACTERIAL SPECTRUM

INCREASED THERAPEUTIC EFFICACY

CHLOROMYCETIN® (chloramphenicol, Parke-Davis) + polymyxin B + hydrocortisone ophthalmic ointment

CHLOROMYCETIN provides effective wide-spectrum therapy. "...is effective against most gram-positive and gram-negative cocci and some gram-negative bacilli. It rarely produces dermatitis and resistant strains are uncommon."[1] "...penetrates the noninflamed eye better than any other antibiotic, regardless of route of administration."[2]

POLYMYXIN B combats gram-negative invaders. "...gram-negative bacilli are being isolated with increasing frequency from the conjunctiva...."[3] Polymyxin B "...is bactericidal against most gram-negative microorganisms...."[4]

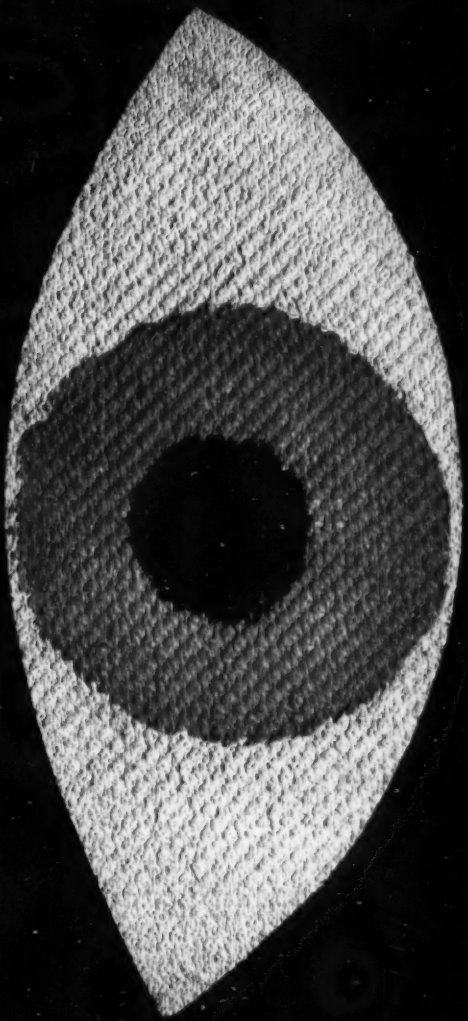
HYDROCORTISONE controls inflammation and allergic reactions. "Cortisone, hydrocortisone and ACTH, by altering the inflammatory responses of the body, cause a decreased amount of scarring and vascularization."[5] "Hydrocortisone is about twice as potent gram for gram as cortisone, even when given locally."[5]

Indications: Provides wide-spectrum antibacterial, anti-inflammatory, and antiallergic action for topical treatment of patients with ocular inflammation complicated by infection.

Administration: Local application two to four times daily as required.

Packaging: OPHTHOCORT Ophthalmic Ointment contains 1% CHLOROMYCETIN® (chloramphenicol, Parke-Davis), 0.5% hydrocortisone acetate, and 5,000 units polymyxin B sulfate per Gm., supplied in ⅛-oz. tubes.

References: (1) Perkins, E. S.: **Practitioner 178**:575, 1957. (2) Queries and Minor Notes, **J.A.M.A. 161**:1032, 1956. (3) Smith, C. H.: **Eye, Ear, Nose & Throat Month. 34**:580, 1955. (4) Blakiston's New Gould Medical Dictionary, ed. 2, New York, McGraw-Hill Book Company, Inc., 1956, p. 945. (5) Ostler, H. B., & Braley, A. E.: **J. Iowa M. Soc. 44**:427, 1954.



PARKE, DAVIS & COMPANY

DETROIT 32, MICHIGAN

66659

PROFESSIONAL PHARMACAL CO., INC., PHARMACEUTICAL MFGS., SAN ANTONIO, TEXAS

GLAUCOMA THERAPY

REDUCE INTRAOCULAR TENSION

WITH BUFOPTO®

MIOCEL®

STERILE **BUFFERED** OPHTHALMIC SOLUTION

MIOCEL is a unique combination of Pilocarpine HCl and Eserine Salicylate. It is an excellent example of therapeutic synergism. Because the effects of Pilocarpine HCl and Eserine Salicylate on the pupil are additive, the administration of MIOCEL is generally more effective than the instillation of either drug alone. The direct stimulatory effect of Pilocarpine HCl in combination with the cholinesterase inactivating effect of Eserine Salicylate results in rapid, intense, and prolonged miosis. The special METHULOSE* base insures uniform and comfortable distribution throughout the conjunctival sac. MIOCEL is extremely useful in the control and treatment of glaucoma and other conditions where intensive miosis is desired.

PACKAGE SIZE
15 cc. Plastic Container
5 cc. Plastic Container

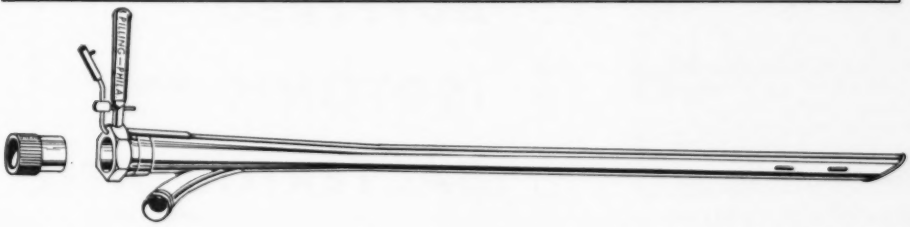
CONTAINS: ESERINE SALICYLATE ⅛ % AND PILOCARPINE HCl 2% IN A STERILE BUFFERED METHULOSE* BASE

Brand of Methylcellulose U.S.P. Reg. U.S. Pat Off

Write for samples and literature.

PROFESSIONAL PHARMACAL CO., INC., Dept. T, 300 W. Josephine St., San Antonio, Texas

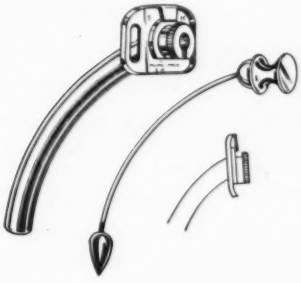
WHAT'S NEW from PILLING



The Riecker Respiration Bronchoscope

Introduced in America by Paul H. Holinger, M.D., Chicago

A complete range of sizes of this special bronchoscope is now available, for dependable control of respiration during bronchoscopic examinations under general anesthesia. The large bore tube on the side of the proximal end, attached by tubing to the anesthesia apparatus, gives an unobstructed flow of gas or oxygen. The proximal end is sealed with a tight-fitting glass window plug which is removed for aspiration of secretions or forceps manipulation. The instrument establishes a simple respiratory system which gives the anesthesiologist full control of respiration.
Available in 3.5 mm. to 9 mm. diameters.



Holinger Trachea Tubes

Designed by Paul H. Holinger, M.D., Chicago

In response to popular demand, a full line of Holinger Trachea Tubes for adults and infants is now available. Designed to fit any patient comfortably and conveniently, the tubes have a unique 65 degree curve which conforms with X-ray studies of the trachea and larynx.

Holinger Trachea Tubes are available in sizes 00 through 8; each size available in 3 lengths. Details supplied on request.

Holinger Laryngectomy Tubes available soon.

Holinger Trachea Tubes are available only from Pilling — order direct

GEORGE P. *PILLING* & SON CO.
3451 Walnut Street • Philadelphia

Pilling New York Office — 4 W. 56th St., N. Y. 19, N. Y., Circle 5-8125
James M. Francisco, 4412 E. Broad St., Columbus 13, Ohio
CABLE ADDRESS: Surgical-Phila.

- STERILE
- BUFFERED
- ISOTONIC
- BACTERIOSTATIC
- CLEANSING

DACRIOSE

STERILE OPHTHALMIC IRRIGATING SOLUTION

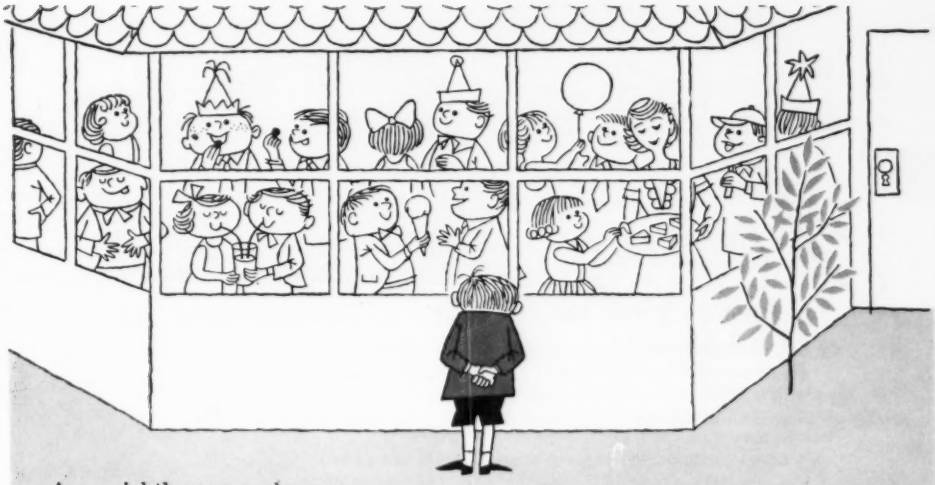
Useful in industrial ophthalmology, regular office routine (dislodging foreign bodies, washing away fluorescein, removing secretions and purulent discharges, etc.), for contact lens practice (washing cornea and contact lenses before and after insertion) and for pre-surgical cleansing of the eye.

For literature and sample, write

THE **ISO-SOL COMPANY, INC.**
Lindenhurst, New York

ISO-SOL®

Pioneer Specialists in Sterile Ophthalmic Solutions



An unsightly eye can be a great drawback to an individual at any stage of life. Other than the lack of vision or very poor acuity often associated with such a problem, these individuals are often socially handicapped and usually overlooked for positions for which they may have excellent qualifications. Employers must take into account their physical characteristics as well as mental capabilities.

Unsightly eyes...

One of the adjuncts of contact lens work is the fitting of the cosmetic contact lens. Contact lenses may be used to cover disfigured corneas and scleras; they are valuable in covering an eye with a tropia where the eye is sightless. The cosmetic contact lens can be used to fill in the eye socket in an enophthalmic eye—and a narrow palpebral fissure can be opened. More and more uses are being found for the cosmetic contact lens.

THE CONTACT LENS CIRCLE W/J

To the center of your contact lens problem

the Plastic Contact Lens Company

Dedicated to Knowledge and Research

59 E. MADISON ST. • CHICAGO 3, ILLINOIS

Looking?

FOR SUPERIOR QUALITY CONTACT LENSES?

1. OBRIG LABORATORIES is the pioneer and oldest manufacturer of plastic contact lenses.
2. OBRIG LENSES are the product of twenty years of research and experience.
3. OBRIG LENSES stand for superior quality and excellent service.
4. OBRIG LABORATORIES makes available to its customers a consultation service and assists them with their problem fitting cases.
5. OBRIG LABORATORIES keeps its fitters abreast of all the latest developments and techniques in the contact lens field.

Obrig LABORATORIES, INC.
Manufacturers of all types of ***contact lenses***

new york office...
75 East 55th Street
New York 22, N. Y.

sarasota, florida office...
P. O. Box 791
Sarasota, Florida

Beaver MINIATURE BLADE KNIFE

FOR FINE SURGERY

Four Miniature blades that permit finer techniques in many tpes of fine surgery such as ophthalmic, oral, plastic and reconstructive, cardiac, neuro, etc. The pencil-shaped handle permits closer, finer control of the cutting action and the blades are keenly edged, sturdy and dependably sharp.

Blades $3.00 per dozen
(Packed 6 of one number per box)

Handles (square, knurled or hexagonal) $2.00

SURGICAL KNIVES BY Rudolph **Beaver**

WALTHAM 54. MASSACHUSETTS

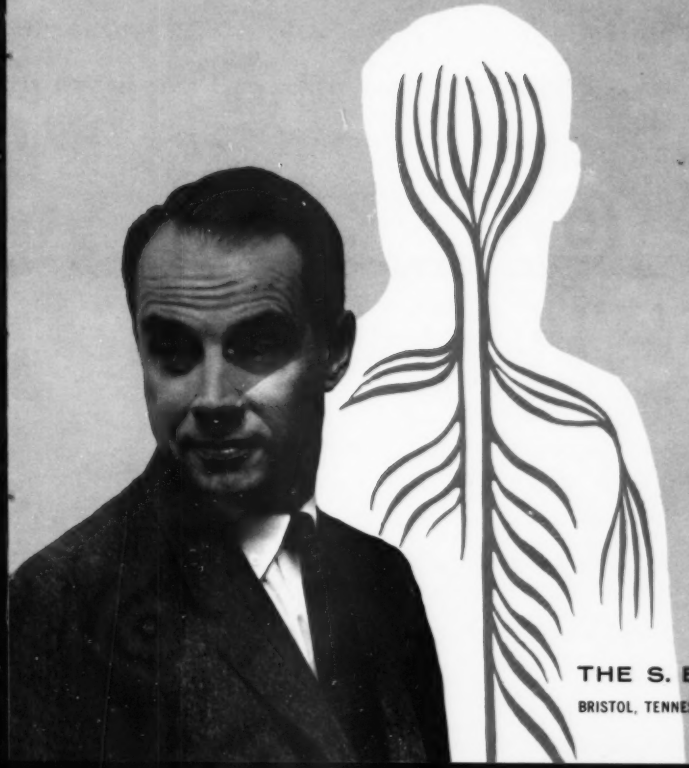
Standard preoperative procedure to control bleeding

adrenosem®*

SALICYLATE

(Brand of carbazochrome salicylate)

OPERATING ROOM



Proven effective by over four years of clinical use, millions of doses

In hemostasis blood clotting is only one factor. Restoration of capillary integrity is of primary importance.[1-5] Adrenosem controls bleeding and oozing by decreasing excessive capillary permeability and promoting the retraction of severed capillary ends.[1-29]

Surgical Use

Adrenosem is recommended preoperatively where bleeding presents a problem. Minimal bleeding provides a clearer operative field and facilitates operative procedures.[9-20,23] Postoperatively, it lessens the need for transfused blood.[3,6,9-11,13,16,18,20,23]

Medical Use

Adrenosem is an effective hemostatic where vascular anomalies exist, such as telangiectasia, purpuras, epistaxis, and others.[1-3,6,9-11,27-29] At recommended dosage levels there are no contraindications.

Supplied: Ampuls, 1 cc., 5 mg.; Tablets, 1 and 2.5 mg.; Syrup, each 5 cc., 2.5 mg. Potency of all dosage forms is stated in terms of the active ingredient, adrenochrome monosemicarbazone.

Write for descriptive literature and dosage schedules

*U. S. Pat. 2581850, 2506294

THE S. E. MASSENGILL COMPANY

BRISTOL, TENNESSEE • NEW YORK • KANSAS CITY • SAN FRANCISCO

Adrenosem®

SALICYLATE

(Brand of carbazochrome salicylate)

effective in more than 200 clinical disorders

Adrenosem has proved effective, both prophylactically and therapeutically, in numerous operative procedures and pathological conditions. Following is a partial list of the many indications for Adrenosem.

tonsillectomy *adenoidectomy* **pharyngectomy** *mastoidectomy* **ma**
ectomy *myoplasty* **septectomy** *turbinectomy* **rhinoplasty** *laryngectomy* **epiglott**
onchotomy *tracheoplasty* **tracheostomy** *pneumonectomy* **pleurectomy** *pe*
hy *pericardiorrhaphy* **splenectomy** *stomatoplasty* **cheiloplasty** *uvulectomy* **pal**
ophagectomy *gastrectomy* **enterotomy** *proctectomy* **proctopexy** *sphincterotomy*
ctomy **hernioplasty** *ureterotomy* **prostatectomy** *vulvectomy* **hysterectomy**
raction *skin grafts* **scar excisions** *dermabrasion* **gastrointestinal bleedin**
axis *metrorrhagia* **menorrhagia** *cervical ooze* **antepartum and postpartum**
m **capillary hemorrhage during hedulin, dicumerol or x-ray therapy**
angiectasia **hemorrhagic retinitis** *subarachnoid hemorrhage* **ecchymosis**

THE S. E. MASSENGILL COMPANY

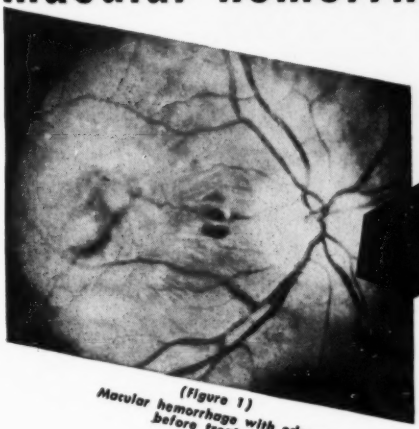
BRISTOL, TENNESSEE • NEW YORK • KANSAS CITY • SAN FRANCISCO

1. Fraham, J.: Arrest of Bleeding, Charles C Thomas, Springfield, Ill. (1934).
2. Dornhorst, G. and Rostron, J.: Adrenaline, Adrenalone, and Mean Bleeding Time, J. Physiol. 90:63 (1937).
3. Bierbaum, D. A.: The Control of Bleeding, Am. J. Surg. 86:391 (Sept., 1953).
4. Folsom, G. P., Lotz, R. E., Shulman, M. H. and Arendt, R. A.: Rotexalin Vanzan as a Test for Susceptibility to Petechial Formation in the Hamster, Yeomen Published by the Am. Assoc. for the Advancement of Science (1954).
5. Pappenheimer, J. R.: Passage of Molecules Through Capillary Walls, Physiol. Rev. 33:387 (July, 1953).
6. Beazley, J. C.: The Use of the Synonic Hemostat Carbazochrome Salicylate, West. J. Surg., Obstet. and Gynec. 64:88 (Jan., 1956).
7. Lingebury, E. C., Jr. and Young, H. E.: A Preliminary Report on Adrenosem Salicylate for Control of Hemorrhage, J. Calif. State Dental Assn. and Nev. State Dental Assn. 31:163 (May-June, 1955).
8. Moss, A. A.: Control of Hemorrhage in Dental Surgery, Dental Survey 32:1622 (Dec., 1956).
9. Poole, J. C.: Adrenosem in the Control of Hemorrhage from the Nose and Throat, A. M. A. Arch. of Otolaryng. 61:450 (Apr., 1955).
10. Poole, J. C.: Further Observations on the Use of Adrenosem Salicylate in the Control of Hemorrhage from the Nose and Throat, N. Car. Med. J. 17:98 (Mar., 1956).
11. Poole, J. C.: Control of Hemorrhage from the Nose and Throat, Med. Times 84:1229 (Oct., 1956).
12. Brode, H. A. and Chimenos, T. C.: A Clinical Evaluation of Adrenosem Salicylate, Ann. of Dentistry 15:56 (Sept., 1956).
13. Owings, Capers B.: The Control of Post-operative Bleeding with Adrenosem, Laryngoscope 65:21 (Jan., 1955).
14. Perkins, R. E. L.: A Clinical Investigation of Adrenochrome Monoaminoguanazole Sodium Salicylate, Oral Surg., Oral Med., Oral Path. 10:230 (Mar., 1957).
15. Zeldetz, C. B. and Rasmavarian, S. B.: Adrenosem for the Prevention of Bleeding in Tonsillectomy, Am. Practitioner and Digest of Treatment 8:385 (Mar., 1957).
16. Donnelly, P. J.: The Cure of the Prostatic Cavity, S. African Med. J. 30:381 (Apr., 1956).
17. Brown, M. S. and Lerner, S. S.: The Unsolved Problem of the Tonsils and Adenoids, The Med. Chain of N. Amer. 40:1749 (Nov., 1956).
18. Orton, E.: Medical Care of the Child Patient Before and After Adenoidectomy and Tonsillectomy, N. Y. State J. Med. 56:886 (Mar., 1956).
19. Riddle, A. C., Jr.: Adrenosem Salicylate: A Systemic Hemostatic, Oral Surg., Oral Med., Oral Path. 8:617 (June, 1955).
20. Roberts, E. W.: Observations on the Use of Adrenosem in Dental Practice, Oral Surg., Oral Med., Oral Path. 10:52 (Jan., 1957).
21. Bost, H. R.: Minimizing Postoperative Bleeding, The Am. J. of Surgery 96:751 (Dec., 1958).
22. Brown, W. S.: Control of Bleeding After Dermabrasion, Northwest Med. 57:470 (Apr., 1958).
23. Coyle, J. E.: Analysis of Blood and Vascular Factors in the Prophylaxis of Tonsillo-Adenoidal Hemorrhage, Laryngoscope 10: 1039 (Oct., 1957).
24. Dismuke, J. E. and Terry, J. G.: Better Control of Bleeding in Vaginal Hysterectomy, Presented before the Texas State Med. Society, Surgical Section (Jan., 1956).
25. Kesney, A. H. and Mody, M. V.: Adrenosem (Carbazochrome) in Primary Glaucoma and Subacute Iridocyclitis, A. M. A. Arch. of Ophth. 54:665 (Nov., 1955).
26. Proctor, D. F. and Douglass, C. C.: Bleeding Following Tonsil and Adenoid Operations, Trans. Amer. Acad. Ophthal., Otolaryngol. 62:592 (July-Aug., 1958).
27. Ryan, Allen J.: Control of Bleeding in Parallel Telangiectasia, The Maryden Hosp. Bull. 7 (Jan., 1958).
28. Wilkins, R. D.: Gastrointestinal Bleeding as Seen by the Proctologist, J. A. M. A. 165: 1314 (Apr. 6, 1957).
29. Feinblatt, T. M., Feinblatt, H. M. and Ferguson, E. A.: Successful Non-Surgical Use of Carbazochrome Salicylate, Amer. Pract. and Dig. of Treatment 9:1827 (Nov., 1958).

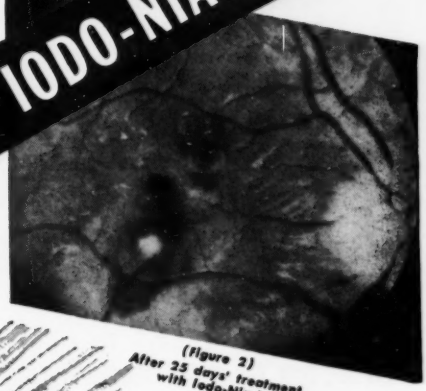
macular hemorrhages

respond to

IODO-NIACIN*



(Figure 1)
Macular hemorrhage with edema, before treatment



(Figure 2)
After 25 days' treatment with Iodo-Niacin

Macular and retinal hemorrhages are satisfactorily absorbed after use of IODO-NIACIN[1]. The dosage used in this study was 1 tablet three times daily.

In cases of cerebral and generalized arteriosclerosis, IODO-NIACIN has been used with great benefit[2]. Full doses were given for a year or longer without any iodism or ill effects.

The formula of IODO-NIACIN Tablets contains potassium iodide 135 mg. (2¼ gr.) combined with niacinamide hydroiodide 25 mg. (⅜ gr.). IODO-NIACIN Ampuls 5 cc. are highly satisfactory for intramuscular or intravenous use[3].

Since the retina is intrinsically a part of the brain[4], hemorrhages in this region are indicative of a similar cerebral condition for which IODO-NIACIN is directly indicated.

IODO-NIACIN Tablets, slosol coated pink, are supplied in bottles of 100. Ampuls 5 cc. in boxes of 10.

1. *Am. J. Ophth*, 42:771, 1956.
2. *Am. J. Digest Dis.* 22:5, 1955.
3. *Med. Times* 84:741, 1956.
4. *Cecil's Textbook of Medicine*, 7th ed., 1947, p. 1598.

Cole
CHEMICAL COMPANY
3721-27 Laclede Ave.
St. Louis 8, Mo.

*U.S. Patent Pending

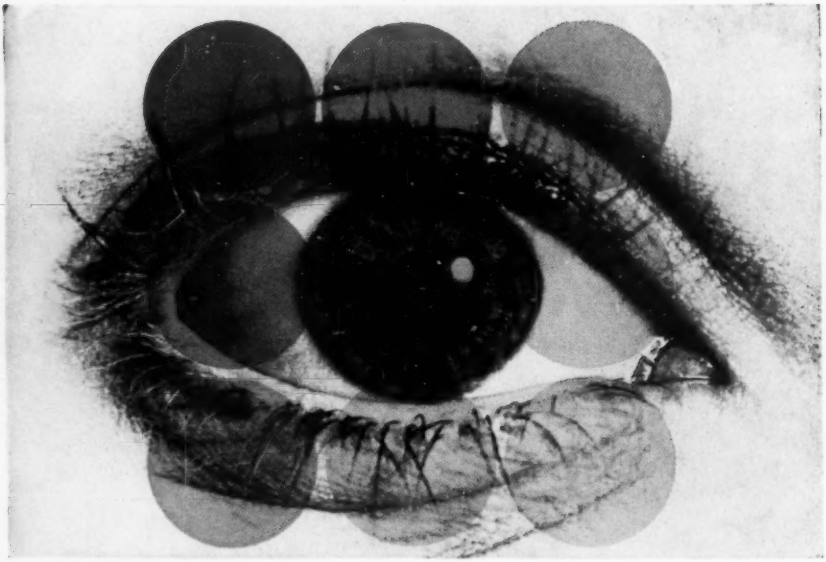
Write for professional samples and literature

Cole Chemical Company AA8
3721-27 Laclede Ave., St. Louis 8, Mo.
Gentlemen: Please send me professional literature and samples of IODO-NIACIN.

DOCTOR.....

STREET.....

CITY.....ZONE.....STATE.....



FOR EYES OF EVERY HUE... CYCLOGYL® FOR CYCLOPLEGIA

NEW... FOR THE DARK BROWN OR BLACK IRIS... CYCLOGYL 2% WITH PVP— the special soothing base containing PVP (polyvinylpyrrolidone) permits use of a higher concentration, effective even in the most darkly pigmented iris.

FOR THE BROWN OR HAZEL IRIS... CYCLOGYL 1%

FOR THE BLUE, GRAY OR GREEN IRIS... CYCLOGYL 0.5%

VALUABLE TIMESAVING— effective within 30 minutes – complete recovery within 30 minutes when a miotic is used.*

MAXIMAL SAFETY "... no significant variation of intraocular tension has been reported ... does not produce any undesirable local or systemic effects following repeated instillation..."[1]

INDICATIONS: Refraction. When both cycloplegia and mydriasis are desired in treatment of iritis, iridocyclitis, keratitis and choroiditis – preoperatively for cataract or other appropriate surgery. (Cyclomydril™ is preferred for diagnostic procedures and therapy requiring only mydriasis).

AVAILABILITY:

New Cyclogyl 2%	7.5 ml. dropper bottle, 2 ml. dropper bottle (prescription size)
Cyclogyl 1%	15 ml. dropper bottle, 2 ml. dropper bottle (prescription size)
Cyclogyl 0.5%	15 ml. dropper bottle

SAMPLES AND LITERATURE AVAILABLE ON REQUEST

*When a miotic cannot be used, recovery occurs within 24 hours.

1. New and Nonofficial Drugs; J. B. Lippincott Company, Philadelphia, 1958, p. 243.

Schieffelin & Co. / Since 1794
Pharmaceutical and Research Laboratories
New York 3, N.Y.

Schieffelin

CYCLOGYL®
(cyclopentolate hydrochloride, Schieffelin)

A COMPLETE TREATMENT ROOM IN A SMALL AREA

The wall mounted treatment cabinet, treatment chair, cuspidor with suction shown above are contained in a 5 x 6 ft. space. Note the comparative absence of visible plumbing and electrical wires. Although this equipment may be used conveniently in a small area it need not be confined to this space. The floor type cabinet can be substituted for the wall mounted type. A number of room arrangements will be furnished on request.

WALL MOUNTED TREATMENT UNIT: Covered with stainless steel. Contains: air regulator with gauge, tubing, cut-off and air filter; nasopharyngoscope rheostat; push button; cautery transformer and rheostat; otoscope transformer and rheostat; transilluminator complete with rheostat, cord, handle lamps, antrum and frontal tips; seven metal drawers on fibre runners and one large drawer for towels; waste container; bakelite covered work table 21″ x 12″; space for five spray bottles, twelve solution bottles, shelf for cotton jars; pocket for history and prescription cards; spray bottle heater. Presents an attractive appearance and will not tarnish and is easy to keep clean. Price complete without glassware $195.00. Without air but with electrical equipment $165.00. With air equipment only $150.00. Without either air or electrical equipment $115.00. Complete set glassware $41.00. Otoscope head, coiled cord and handle $29.50 complete.

FLOOR TYPE TREATMENT UNIT: Essentially the same as our wall mounted unit but designed for the physician who desires a movable floor type cabinet (glides are furnished if roll-around is not desired). May be obtained with built-in pressure. No. 501 DeVilbiss pump is used.

CHAIR: Can be placed in horizontal position, will not tip in this position; raised and lowered by large hand wheel 18″ to 24″; paper covered headrest removable; chair locks with foot-pedal; bakelite arm-rests removable. Back locks rigidly in any position. Chair as shown but less light, in colors brown, green or black $155.00 (other colors available at $5.00 extra). By adding a footrest and turning handle chair can be used for turning tests. This additional equipment is easily and quickly removable. Add $30.00.

COMBINED SUCTION AND CUSPIDOR: Designed to eliminate the cost of installing a separate suction. The apparatus is 12″ wide and projects 13¼″ from the wall. The flushing rim and the suction is furnished with a vacuum breaker and should meet all plumbing requirements. Stop and trap not furnished. Available in ivory, green and white. Price $103.00.

INSTRUMENT TABLE: Table top size 11″ x 17″, heavy base of procelain enamel on casters, standard is chromium plated, table stainless steel. Single deck $34.00, double deck (as shown) $40.00.

EXAMINING LIGHTS: Chair mounted light, a flexible goose-neck lamp which can be moved up or down, this lamp may also be mounted on the wall as shown. Price $22.00. A telescopic light attached to the ceiling or may be attached to the base board in back of chair. Available in 4, 5, 6 and 7 ft. (extended). 4 ft. $16.50 (add one dollar per additional ft.).

LIGHT SHIELD: Takes an ordinary 100 watt lamp. Will not burst, spot can easily be rotated. $5.00.

PHYSICIAN'S STOOL: A soft upholstered stool with easy running ball bearing stem casters (shown). $20.00. Stool with back, $26.00. Colors as listed for treatment chairs.

All Prices are F.O.B. Los Angeles, Calif.
Slightly Higher Outside of U. S.

Surgical — Mechanical — Research, Inc.
ESTABLISHED 30 YEARS

1901-1903-1905 Beverly Blvd. SMR Los Angeles 57, Calif.

TWO NEW MANUALS

VOCAL REHABILITATION
by FRIEDRICH S. BRODNITZ, M.D.

Part 1. The Speaking and Singing Voice
Part 2. Functional Disorders of the Voice
Part 3. Organic Voice Disorders
Twenty-two chapters, 112 pages, 18 figures

PRICE $2.00

ALLERGY IN OTOLARYNGOLOGY
by FRENCH K. HANSEL, M.D.
JACK R. ANDERSON, M.D.

Including chapters on such closely related subjects as immunity through use of bacterial and fungus vaccines, vascular headaches and related phenomena, and the use and abuse of antibiotics.

Twenty-three chapters, 186 pages.

PRICE $2.00

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

15 Second St. S. W., Rochester, Minn.

Ophthalmic

LENS COATINGS

Lestra-Lite
Mira-Lite
Gradient Density
NUTRA

for COMPLETE GLARE PROTECTION

- **Metallic**
- **Anti-Reflection**
- **Neutral Absorptive**

Service is fast, dependable, and guaranteed. Lenses returned prepaid.

See Our Lens Coating Display
Rm. 758, Palmer House, Chicago
Annual Convention, Oct. 11-16

PACIFIC UNIVERSAL PRODUCTS CORPORATION
168 North Vista Avenue • Pasadena 8, California

Students . . .

LEARN EMBRYOLOGY
of the
EYE — EAR — NOSE — THROAT
Motion Pictures in color with sound

show the complete development of the eye and the extrinsic muscles. The blood and nerve supplies of the eye and orbit are traced with clarity from the beginning to the adult stage. Muscle anomalies and their consequences can be fully understood after the demonstration of development of extraocular muscles from the original embryonic buds. The chamber angle and the trabeculae are visually demonstrated. See the complete development of the lens and the vitreous.

show in three reels the development of the external, middle and inner ear with a summary for ready orientation. See the first diagrammatic demonstration of the rotation of the middle ear during early development and the relation of the inner ear to the mechanistic architecture of the conduction apparatus.

An Album of Selected Pathological Sections of the Ear, Nose and Throat, prepared especially for graduate students from colored prints of frames from the motion picture. The motion picture and the albums are made to supplement each other. Take them both.

Write for description and prices to

AMERICAN ACADEMY of OPHTHALMOLOGY and OTOLARYNGOLOGY

15 Second St. S. W., Rochester, Minn.

American Academy of Ophthalmology and Otolaryngology

THE COUNCIL — 1959

John H. Dunnington, New York ..... President
Dean M. Lierle, Iowa City ..... President-Elect
Gordon D. Hoople, Syracuse, New York ..... First Vice-President
S. Rodman Irvine, Beverly Hills, California ..... Second Vice-President
Lyle M. Sellers, Dallas ..... Third Vice-President
A. C. Furstenberg, Ann Arbor, Michigan ..... Past President
Erling W. Hansen, Minneapolis ..... Past President
LeRoy A. Schall, Boston ..... Past President
William L. Benedict, Rochester, Minnesota ..... Executive Secretary-Treasurer; Editor and Business Manager of the TRANSACTIONS
Kenneth L. Roper, Chicago ..... Secretary for Ophthalmology
Eugene L. Derlacki, Chicago ..... Secretary for Otolaryngology
A. D. Ruedemann, Detroit ..... Secretary for Instruction in Ophthalmology
Dean M. Lierle, Iowa City ..... Secretary for Instruction in Otolaryngology and Maxillofacial Surgery
Daniel Snydacker, Chicago ..... Secretary for Home Study Courses
Glen G. Gibson, Philadelphia ..... Secretary for Public Relations
William J. McNally, Montreal, Quebec, Canada ..... Councillor
Victor A. Byrnes, Washington, D. C. ..... Councillor
Victor Goodhill, Los Angeles ..... Councillor
Edwin B. Dunphy, Boston ..... Councillor

COUNCIL COMMITTEES

EXECUTIVE, RESEARCH, AND FINANCE

John H. Dunnington, *Chairman*
A. C. Furstenberg — Dean M. Lierle
Erling W. Hansen — William J. McNally
LeRoy A. Schall — William L. Benedict

RESEARCH AND FINANCE

(*Subcommittee of Executive, Research and Finance*)
A. C. Furstenberg, *Chairman*
John H. Dunnington — William L. Benedict

ACTIVITIES

William J. McNally, *Chairman*
Victor A. Byrnes — Dean M. Lierle
Victor Goodhill — Gordon D. Hoople
Edwin Dunphy

JUDICIAL

John H. Dunnington, *Chairman*
William J. McNally — Victor Goodhill
Victor A. Byrnes — Edwin B. Dunphy

BOARD OF COUNCILLORS

William J. McNally, *Chairman*
Victor A. Byrnes — Edwin B. Dunphy
Victor Goodhill

BOARD OF SECRETARIES

William L. Benedict, *Chairman*
Kenneth L. Roper — Dean M. Lierle
Eugene L. Derlacki — Daniel Snydacker
A. D. Ruedemann — Glen G. Gibson

PROGRAM

John H. Dunnington, *Chairman*
Dean M. Lierle — Eugene L. Derlacki
Gordon D. Hoople — A. D. Ruedemann
William J. McNally — Daniel Snydacker
William L. Benedict — Glen G. Gibson
Kenneth L. Roper

STANDING COMMITTEES

AUDIO-VISUAL EDUCATION

Dean M. Lierle, M.D., *Chairman* ..... Iowa City
W. L. Benedict, M.D., *ex officio* ..... Rochester, Minn.
Eugene L. Derlacki, M.D. ..... Chicago
Kenneth L. Roper, M.D. ..... Chicago
A. D. Ruedemann, M.D. ..... Detroit

CONSERVATION OF HEARING

Executive Committee

Dean M. Lierle, M.D., *Chairman* ..... Iowa City
Lawrence R. Boies, M.D. ..... Minneapolis
John E. Bordley, M.D. ..... Baltimore
Norton Canfield, M.D. ..... New Haven, Conn.
Hallowell Davis, M.D. ..... St. Louis
Edmund P. Fowler, Jr., M.D. ..... New York
Meyer S. Fox, M.D. ..... Milwaukee
Aram Glorig, Jr., M.D. ..... Los Angeles
Victor Goodhill, M.D. ..... Los Angeles
Gordon D. Hoople, M.D. ..... Syracuse, N. Y.
Howard P. House, M.D. ..... Los Angeles
Raymond E. Jordan, M.D. ..... Pittsburgh
Arthur L. Juers, M.D. ..... Louisville, Ky.
Clair M. Kos, M.D. ..... Iowa City
John R. Lindsay, M.D. ..... Chicago
H. E. McHugh, M.D. ..... Montreal, Que., Canada
James W. McLaurin, M.D. ..... Baton Rouge, La.
W. J. McNally, M.D. ..... Montreal, Que., Canada
C. Stewart Nash, M.D. ..... Rochester, N. Y.
Harold Schuknecht, M.D. ..... Detroit
George E. Shambaugh, Jr., M.D. ..... Chicago
Kinsey M. Simonton, M.D. ..... Rochester, Minn.
Joseph A. Sullivan, M.D. ..... Toronto, Ont., Canada
J. Tonndorf, M.D. ..... Iowa City

Consultants

Raymond Carhart, Ph.D. ..... Evanston, Ill.
Howard A. Carter ..... Chicago
Merle Lawrence, Ph.D. ..... Ann Arbor, Mich.
Scott N. Reger, Ph.D. ..... Iowa City
Walter A. Rosenblith, Ph.D. ..... Cambridge, Mass.
Joseph C. Serio, M.D. ..... Buffalo, N. Y.
Richard Silverman, Ph.D. ..... St. Louis

EVALUATION OF THE NONSURGICAL TREATMENT OF STRABISMUS

Daniel Snydacker, M.D., *Chairman* ..... Chicago
Francis Heed Adler, M.D. ..... Philadelphia
Hermann Burian, M.D. ..... Iowa City
Edmond L. Cooper, M.D. ..... Detroit
Frederick C. Cordes, M.D. ..... San Francisco
Frank D. Costenbader, M.D. ..... Washington, D. C.
John W. Henderson, M.D. ..... Ann Arbor, Mich.
William E. Krewson, III, M.D. ..... Philadelphia
Marshall M. Parks, M.D. ..... Washington, D. C.
Maynard C. Wheeler, M.D. ..... New York

IMPLANTS AND IMPLANT TECHNIQUES

A. D. Ruedemann, M.D., *Chairman* ..... Detroit
Alston Callahan, M.D. ..... Birmingham
Norman L. Cutler, M.D. ..... Wilmington, Del.
Orwyn H. Ellis, M.D. ..... Los Angeles
Wendell L. Hughes, M.D. ..... Hempstead, L. I., N. Y.
Byron Smith, M.D. ..... New York
Richard C. Troutman, M.D. ..... New York

Representatives from Eyemakers

Lee Allen ..... Iowa City
Roger Alton ..... Southbridge, Mass.
Fritz Iardon ..... Detroit
Hugh Laubheimer ..... Chicago

STANDING COMMITTEES — *Continued*

Ophthalmic Pathology

Michael J. Hogan, M.D., *Chairman* ..... San Francisco
F. Phinizy Calhoun, Jr., M.D. ..... Atlanta, Ga.
John S. McGavic, M.D. ..... Bryn Mawr, Pa.
Theodore E. Sanders, M.D. ..... St. Louis

Consultant in Pathology at AFIP
Lorenz Zimmerman, M.D. ..... Washington, D. C.

Otolaryngic Pathology

Paul H. Holinger, M.D., *Chairman* ..... Chicago
David D. DeWeese, M.D. ..... Portland, Ore.
Edmund P. Fowler, Jr., M.D., ... New York
John R. Lindsay, M.D. ..... Chicago
James W. McLaurin, M.D. ..... Baton Rouge, La.
John A. Murtagh, M.D. ..... Hanover, N. H.
George F. Reed, M.D. ..... Boston
Ben H. Senturia, M.D. ..... St. Louis

Reconstructive Plastic Surgery

John Marquis Converse, M.D., *Chairman*, New York
Wendell L. Hughes, M.D., *Co-Chairman*, New York
Oscar Becker, M.D. ..... Chicago
Edgar M. Holmes, M.D. ..... Boston
William C. Huffman, M.D. ..... Iowa City
Charles E. Iliff, M.D. ..... Baltimore
Dean M. Lierle, M.D. ..... Iowa City
Merrill J. Reeh, M.D. ..... Portland, Ore.
Byron Smith, M.D. ..... New York
Edmund B. Spaeth, M.D. ..... Philadelphia
A. D. Ruedemann, M.D. ..... Detroit
Sidney K. Wynn, M.D. ..... Milwaukee

Research in Otolaryngology

Harold F. Schuknecht, M.D., *Chairman* ..... Detroit
Cesar Fernandez, Ph.D. ..... Chicago
Aram Glorig, Jr., M.D. ..... Los Angeles
Victor Goodhill, M.D. ..... Los Angeles
Merle Lawrence, Ph.D. ..... Ann Arbor, Mich.
W. Dewey Neff, Ph.D. ..... Chicago
Gunnar O'Neil Proud, M.D. ..... Kansas City, Mo.
Joseph Sataloff, M.D. ..... Philadelphia
Ben H. Senturia, M.D. ..... St. Louis
Catherine Smith, Ph.D. ..... St. Louis
Juergen Tonndorf, M.D. ..... Iowa City
Hans von Leden, M.D. ..... Chicago

Scientific Exhibit

Kenneth L. Roper, M.D., *Chairman* ..... Chicago
Eugene L. Derlacki, M.D., *Co-Chairman* ..... Chicago

Standardization of Tonometers

E. J. Ballintine, M.D., *Chairman* ..... Cleveland
Moacyr E. Alvaro, M.D. ..... Sao Paulo, Brazil
Bernard Becker, M.D. ..... St. Louis
Conrad Berens, M.D. ..... New York
W. Morton Grant, M.D. ..... Boston
D. O. Harrington, M.D. ..... San Francisco
Thomas H. Hodgson, M.D. ..... Toronto, Ont., Canada
Peter C. Kronfeld, M.D. ..... Chicago
John C. McCulloch, M.D. ..... Toronto, Ont., Canada
Earle H. McBain, M.D. ..... San Rafael, Calif.
John M. McLean, M.D. ..... New York
Robert A. Moses, M.D. ..... New York
Adolph Posner, M.D. ..... New York
Robert N. Shaffer, M.D. ..... San Francisco

Surgery of the Head and Neck

LeRoy A. Schall, M.D., *Chairman* ..... Boston
Virgil G. Casten, M.D. ..... Boston
Edwin W. Cocke, Jr., M.D. ..... Memphis
John J. Conley, M.D. ..... New York
William C. Huffman, M.D. ..... Iowa City
John Lewis, M.D. ..... New York
Dean M. Lierle, M.D. ..... Iowa City
Joseph H. Ogura, M.D. ..... St. Louis
George A. Sisson, M.D. ..... Syracuse, N. Y.

Teachers' Section

Otolaryngology
John A. Kirchner, M.D., *Chairman* ..... New Haven, Conn.

Ophthalmology
A. D. Ruedemann, M.D., *Chairman* ..... Detroit

Use of Alpha Chymotrypsin in Ophthalmology

Derrick Vail, M.D., *Chairman* ..... Chicago
A. Edward Maumenee, M.D. ..... Baltimore
David Shoch, M.D. ..... Chicago
Richard C. Troutman, M.D. ..... New York
Ludwig von Sallmann, M.D. ..... Bethesda, Md.

Use of Diagnostic Procedures and Therapy in Uveitis

A. D. Ruedemann, M.D., *Chairman* ..... Detroit
Bernard Becker, M.D. ..... St. Louis
Alson E. Braley, M.D. ..... Iowa City
David Cogan, M.D. ..... Belmont, Mass.
Michael J. Hogan, M.D. ..... San Francisco
Irving H. Leopold, M.D. ..... Philadelphia
A. Edward Maumenee, M.D. ..... Baltimore
Frank W. Newell, M.D. ..... Chicago

Representatives of the Academy to:

American Association for the Advancement of Science

M. Elliott Randolph, M.D. ..... Baltimore

American Board of Ophthalmology

Gordon M. Bruce, M.D. ..... New York
Alson E. Braley, M.D. ..... Iowa City
Kenneth C. Swan, M.D. ..... Portland, Ore.
W. Banks Anderson, M.D. ..... Durham, N. C.

American Board of Otolaryngology

Francis E. LeJeune, M.D. ..... New Orleans
George F. Reed, M.D. ..... Boston

American Committee on Optics and Visual Physiology

James E. Lebensohn, M.D. ..... Chicago
Kenneth C. Swan, M.D. ..... Portland, Ore.
Frederick C. Cordes, M.D. ..... San Francisco

American Orthoptic Council

Philip Knapp, M.D. ..... New York
John W. Henderson, M.D. ..... Ann Arbor, Mich.
Frank D. Costenbader, M.D. ..... Washington, D. C.

American College of Surgeons Board of Governors

Harry P. Schenck, M.D. ..... Philadelphia
James V. Bolger, Jr., M.D. ..... Milwaukee
Shirley H. Baron, M.D. ..... San Francisco

American Standards Association Committee for Standardization of Ophthalmic Lenses

Carl J. Rudolph, M.D. ..... South Bend, Ind.
Arthur C. Linksz, M.D. ..... New York

Alternates
Conrad Berens, M.D. ..... New York
Frank W. Newell, M.D. ..... Chicago

American Standards Association Acoustical Standards Board

Edmund P. Fowler, Jr., M.D. ..... New York

Joint Committee on Eye Banks

Alson E. Braley, M.D. ..... Iowa City
John Harry King, Jr., M.D. ..... Chevy Chase, Md.

National Committee on Research in Ophthalmology and Blindness

Bernard Becker, M.D. ..... St. Louis
A. Edward Maumenee, M.D. ..... Baltimore

National Congress of Parents and Teachers

Frank D. Costenbader, M. D. ..... Washington, D. C.

National Society for Crippled Children and Adults, Inc.

Dean M. Lierle, M.D. ..... Iowa City

BASIC CONCEPTS: ORIENTATION

DAVID G. COGAN, M.D.

BOSTON, MASSACHUSETTS

THIS symposium was planned not only because of a current interest in the effects of radiation on the eye but also because of an increasing awareness that we, as physicians, should know hazards and therapeutic possibilities of radiation. Insofar as the eye is a unit of the body, it will manifest many of the cytopathologic changes that are found in other body tissues, but it also has its own peculiar sensitivities. We therefore have a duty to keep abreast of current advances in radiobiology and to acquire some measure of authority for evaluating the potentialities and liabilities of irradiation of the eye.

It is the purpose of this symposium to provide a background for the understanding of radiation ophthalmology. We have gathered together a group of experts representing radiation biology, radiation therapy, and ophthalmology. We shall attempt to present a comprehensive, though necessarily incomplete, synopsis of the field and then have an open session for questions and, possibly, answers.

My function will be to identify our interests in radiation as ophthalmologists, stating the types of radiation with which we are concerned and the types of ocular lesions produced. The more penetrating considerations of dosimetry, mechanisms, and therapy I will leave to my knowledgeable colleagues who will concentrate on ionizing radiations.

Presented at the Sixty-Third Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 12-17, 1958, Chicago.

We had much difficulty in choosing a title. My suggestion that we call it "What Every Ophthalmologist Should Know about Radiation" broke down when we couldn't agree that every ophthalmologist should know all that we planned to present. At least there was some element of question about it. The title was therefore modified to: "*Aspects* of Radiation of Interest to Ophthalmologists." This was scrutinized by those who had not proposed it and they found it wanting in that not all aspects were being considered. The title was therefore changed to: "*Some* Aspects of Radiation of Interest to Ophthalmologists." It was further noted, however, that only a limited band of radiation was really being considered whence the title was changed to: "*Some* Aspects of *Certain* Radiations of Interest to Ophthalmologists."

But in all honesty and humility we could not affirm that what we had to say would be of interest to ophthalmologists, however desirous we might be of that goal. Hence the title had to be changed to: "*Some* Aspects of *Certain* Radiations of *Possible* Interest to Ophthalmologists."

Finally the coup de grâce was delivered by one of us who pointed out that even this would not necessarily apply to all ophthalmologists and to be correct the title should be further modified to: "*Some* Aspects of *Certain* Radiations of *Possible* Interest to *Some* Ophthalmologists."

Although entirely in accord with the principle of precision in medical writing, this title was so encumbered that, like the proverbial dinosaurs, it was destined for extinction in favor of the more adaptable, although less informative, title which the symposium now bears.

The electromagnetic spectrum is a continuum of wave motion varying from infinitely long wave lengths at one end to infinitely short wave lengths at the other end (table I). At the long end are the radio waves, whose wave lengths are ordinarily presented in units of meters, but in the high frequency ranges the waves may be as short as a few centimeters or less. In this latter region they are often called microwaves.

Then we have the infrared rays, with wave lengths varying from 20,000 millimicrons to slightly less than 1,000 millimicrons. Continuous with the infrared rays is the visible portion of the spectrum comprising the octave approximately from 800 to 400 millimicrons and subdivided into the colors of light. Next is the ultraviolet portion with wave lengths of 400 to 100 millimicrons; this is divided into the long ultraviolet portion having wave lengths greater than 300 millimicrons and the short ultraviolet portion with wave lengths less than 300 millimicrons. This latter contains the highly significant band, called abiotic, between 300 and 260 millimicrons. Shorter than the ultraviolet are the grenz rays which, as their name implies, are on the border separating ultraviolet and x-rays. Grenz rays have wave lengths of the order of 0.5 to 0.1 millimicron.

TABLE I

ELECTROMAGNETIC SPECTRUM

TYPES OF RADIATION	CHIEF MODE OF ENERGY DISSIPATION	OCULAR LESIONS
Radio (microwaves)	Molecular agitation	Cataracts
Infrared	Molecular agitation	Cataracts; retinal burn
Visible	Molecular agitation and resonance	Possible retinal burn
Ultraviolet	Molecular agitation and resonance	Keratoconjunctivitis
Grenz rays	Ionization	Keratoconjunctivitis
X-rays (gamma rays)	Ionization	Keratoconjunctivitis cataracts; retinal changes
Cosmic rays	Ionization	None

X-rays have wave lengths in the general range of 0.03 to 0.005 millimicron, with those on the long end being referred to as "soft" x-rays and those on the short end as "hard" x-rays. The wave lengths of x-rays will actually be determined by the voltage used in their production. Ordinarily those generated with less than 50 kilovolts are referred to as soft x-rays while those generated with more than 50 kilovolts, and this may extend up to many million electron volts, are referred to as hard x-rays.

Gamma rays are identical to x-rays except that they are derived from radioactive sources rather than from artificial acceleration of electrons. Their energies are usually measured in terms of electron volts. The differentiation of gamma rays from hard x-rays, therefore, is a matter of historical semantics rather than of physical quality.

Cosmic rays at the extreme short end of the spectrum are derived from interstellar space and have wave lengths of the order of 10^{-4} millimicron or less.

Whether or not these electromagnetic radiations will have an effect on the eye will depend on the manner in which their energies are dissipated in tissue, and thereby on their penetration, as well as on a variety of factors at the cellular level comprehensively designated as *radiosensitivity.*

For the purposes of this symposium we shall confine our attention to the so-called ionizing radiations and, except for what is noted in the accompanying charts, we shall not consider the manner of absorption or the types of lesions produced by other types of radiation.

The ionizing portions of the electromagnetic spectrum are those which are in the range of grenz rays or shorter. They owe their name and their biologic effect to the fact that their absorption of energy is associated with the ejection of an electron and consequent formation of ion pairs. Whether or not they penetrate into the eye, or through the eye, will depend on their respective energies. Grenz rays and the softer x-rays will be absorbed entirely in the superficial layers of the eye and will produce only a keratoconjunctivitis; while the harder x-rays, those with potentials of 100 or more kilovolts, will penetrate the eye and may cause, in addition to keratoconjunctivitis, opacification of the lens and retinal changes (table II).

TABLE II

IONIZING RADIATIONS

ELECTROMAGNETIC	CORPUSCULAR ANALOGUES	OCULAR LESIONS
	Alpha particles	Superficial keratitis?
Grenz rays		Keratoconjunctivitis
Soft x-rays	Beta particles	Keratoconjunctivitis; occasionally cataracts
Hard x-rays (gamma rays)	Neutrons	Keratoconjunctivitis; cataracts; retinopathy
Cosmic rays		None

In addition to the ionization produced by the electromagnetic spectrum, probably by wave motions, atomic particles may produce ionization in tissue and have effects quite similar to, if not identical with, those of the ionizing portion of the electromagnetic spectrum. The atomic particles which concern us most at present are the alpha particles, made up of charged helium atoms; the beta particles, which are free electrons (and called cathode rays when artificially produced in electron accelerators), and the neutrons. These, too, will have effects on the eye as a function of their penetration and manner of energy dissipation.

The alpha particles will not penetrate effectively more than a fraction of a millimeter; therefore, they have no serious consequences (or usefulness) in ophthalmology. The beta particles will penetrate tissue in accordance with their initial acceleration, but those with average energies of 0.34 million electron volts, as in radium D, or of 0.80 million electron volts, as in radioactive strontium (Sr^{90}), will not penetrate more than a few millimeters. They will cause keratoconjunctivitis and, with sufficient exposure, cataracts. On the other hand, neutrons bearing no charge will penetrate tissue effectively and have all the biologic effects exhibited by hard x-rays or gamma rays. Thus neutrons may cause not only a superficial keratoconjunctivitis but cataracts and retinal changes as well. In fact, because of the greater ion density which they produce, the neutrons are several times more damaging, that is more cataractogenic, than are x-rays and gamma rays compared on the basis of the amount of equivalent energy loss in tissue.

With this necessarily brief introduction we will pass on to consideration of *some* specific aspects of *possible* interest to *some* ophthalmologists by other members of this panel.

BIOLOGIC EFFECTS OF RADIATION AND A DISCUSSION OF RADIOLOGICAL UNITS

TITUS C. EVANS, PH.D.
IOWA CITY, IOWA

BY INVITATION

To those familiar with the rapid and localized effects of topical medication, the slow but progressive nature of radiation damage is somewhat mysterious. Contrary to the mechanism of visible or infrared radiation, where the immediate and temporary effects may be noted because of the large amount of energy absorbed superficially, the delayed macroscopic appearance of effects of ionizing radiation is due to the progression from submicroscopic areas of damage, where the energy has been absorbed, to the spread of these to include the entire cell. There is also the gradual increase in damage due to the increase in number of cells that have been killed or injured. The period of time following the radiation exposure to the appearance of injury is called the latent period. Actually if one were able to see the basic effects of radiation, these would be instantaneous. However, they are so minute as to escape our attention until the damage has progressed to larger units, causing histologic or cytologic damage which we can detect.

RADIATION AND ENERGY

I would like to discuss the radiations which have the capacity to ionize and to explain the use of some of the terms that radiologists and radiation biologists employ. We have, in general, to consider two types of ionizing radiation. One of these is electromagnetic or wavelike radiation, the other is particulate radiation. In considering the electromagnetic radiation, there is a spectrum of different wave lengths. The radio waves have extremely long wave lengths; the infrared waves are somewhat shorter; the wave lengths of visible radiation are still shorter; then we come to the ultraviolet (which are still shorter). The shortest wave lengths are those of X and high-energy gamma radiation. We find that the energy of the various electromagnetic radiations can be expressed as $E = h\nu$, E being the energy, h being Planck's constant and ν being the frequency. There is an inverse relationship between frequency and wave length. In other words, the shorter the wave length, the greater the frequency of the oscillations. The quality or the energy of a beam of electromagnetic radiation may be characterized by the energy at which it is generated, the inherent filtration and the half value layer.

The energy of particles may be expressed as $E = 0.5\ mv^2$ We find that particles vary in mass (m) and in velocity (v). Only the highest energy particles approach the speed of light, whereas all the electromagnetic radiation moves at this speed. The following particles are used in radiation biology and in radiation therapy:

Presented at the Sixty-Third Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 12-17, 1958, Chicago.

1. The alpha particle, which is the nucleus of the helium atom, is one of the emissions from a radium source which is usually filtered out. This particle has a positive charge; it has a mass number of four and an atomic number of two.

2. The beta particle is negatively charged and has a mass of 1/1800 of that of a proton. At rest in an atom, it represents the orbital electron.

3. The proton is a positively charged particle present in the nucleus and has a mass number of one and an atomic number of one. The neutron has a mass equivalent to that of the proton; it is also found within the nucleus, but it has no charge.

We think of the structure of the atom as consisting of a nucleus in the center with one or more positive charges and with negatively charged electrons revolving around the nucleus in various orbits. The number of positively charged particles in the nucleus determines the atomic number and also determines the number of electrons revolving around the nucleus. This represents the chemical identity of the atom; for example, hydrogen has an atomic number of one (one electron in its orbit), whereas helium has an atomic number of two with two electrons in the outer orbit. The atomic weight is determined by the total number of particles in the nucleus. The other particles of the nucleus, which are not charged, are the neutrons.

Isotopes are atoms of the same atomic number but of different atomic weight. In other words, they have a different number of neutrons in the nucleus. Some isotopes are stable but others are radioactive and decay at definite rates. The time required for a certain lot of radioactive material to decrease to half of its original value we speak of as its physical half life.

The first radioactive material was standardized by weight, such as the radium unit being a gram. One one-thousandth of this is a milligram (mg.) and a thousandth of a milligram is a microgram (μg). When the gas (emanation) from radium (radon) was discovered, it was realized that it would be more practical to quantitate the radon in terms of disintegration rate. Therefore, the disintegration per second of that amount of radon in equilibrium with the gram of radium is spoken of as a curie. This number was found to be 3.7×10^{10} disintegrations per second. We now use this unit for all radioactive isotopes, including the artifically produced ones. A smaller unit is the microcurie, and is easy to remember as it is 37 thousand disintegrations per second.

Some of these disintegrations result in the emission of beta particles, some produce alpha particles and some produce gamma as well as beta radiation. When a beta particle is emitted, it comes from a neutron and leaves a proton behind, thus causing the nucleus to have one more charged particle than it had previously. This results in the addition of a new electron in the outer orbits and thus changes the element to one which is one place higher in the periodic table. This changing of one element into another is called transmutation.

Some radioactivity occurs naturally, but radioactivity can be induced artificially by bombarding the atom with neutrons. Some elements under some conditions are made radioactive without transmutation; thus one has a small amount of the radioactive material in the presence of a larger amount of nonradioactive material of the same kind. Where radioactivity is induced along with transmutation, chemical separation of the radioactive element can be carried out and one can have carrier-free radioactive material.

INTERACTION OF RADIATION AND MATTER

One way in which a photon (quantum of electromagnetic radiation) may be slowed and absorbed is by giving up its energy to an electron and removing it from the orbit of an atom. This is called photoelectric absorption. The electron knocked out by the photon has enough energy to move through matter, coming in contact with other electrons and producing ion pairs. It is this photoelectron, then, that does the ionizing although the original step was produced by the photon which is a unit of electromagnetic radiation. Sometimes the energy of the wave is not entirely given up in the moving of an electron and it is scattered in another direction with a reduced amount of energy. This is called Compton scattering.

X-rays are produced in a vacuum by boiling off electrons from a hot filament. The electrons, being negatively charged, are attracted to the positive pole of the x-ray tube with a potential of several thousand volts. The velocity thus given to the electron allows it to collide with atoms of the target material with enough energy to remove orbital electrons. Some of the electrons are also slowed down by coming close to the nucleus of atoms. Slowing down of the electrons gives rise to electromagnetic radiation.

There are, in general, two types of x-rays: one is general or white radiation, consisting of many different wave lengths; superimposed upon this general spectrum of x-rays are some which are characteristic of the orbital electrons of the particular metal of the target. If an electron from an inner orbit is removed, then an outer electron drops into its place. By so doing, it gains potential energy but loses kinetic energy. The difference in the potential energy level that it originally had and the one that it now possesses is expressed in the energy imparted in the electromagnetic or x-radiation.

Many of the x-rays produced are extremely soft and nonpenetrating and may be filtered out by metal filters. That thickness of metal, such as aluminum or copper, which will reduce the intensity of the x-rays to one half is called the half value layer and is an expression of the quality of the radiation beam. The more energetic beam will require a greater thickness of metal to reduce its intensity to one half.

It is interesting to realize that electrons can produce radiations like x-rays even though they are not in a vacuum. For example, a strong beta ray absorbed in a thin metal strip will produce a radiation like x-rays, which has been called *Bremsstrahlung*. Although the intensity may be low, it is important to remember this, for the secondary radiation produced is much more penetrating than the original beta radiation.

SOME DEFINITIONS OF UNITS

The unit of exposure dose is the roentgen and represents that amount of ionization which will take place in a cubic centimeter of air under standard conditions (fig. 1). This is equivalent to one electrostatic unit of charge. If one were to measure the energy absorbed in one cubic centimeter of air in terms of ergs per gram it would be about eighty-three. This then has been called the roentgen equivalent physical and may be considered as an exposure dose for any type of radiation producing ionization. One then speaks of the roentgen equivalent physical for beta and alpha as well as x-radiation. One usually measures the exposure dose in air, but it may be measured on the surface, where backscatter is included, or it may be measured at a certain depth in tissue, which is called the depth dose. If one measures the

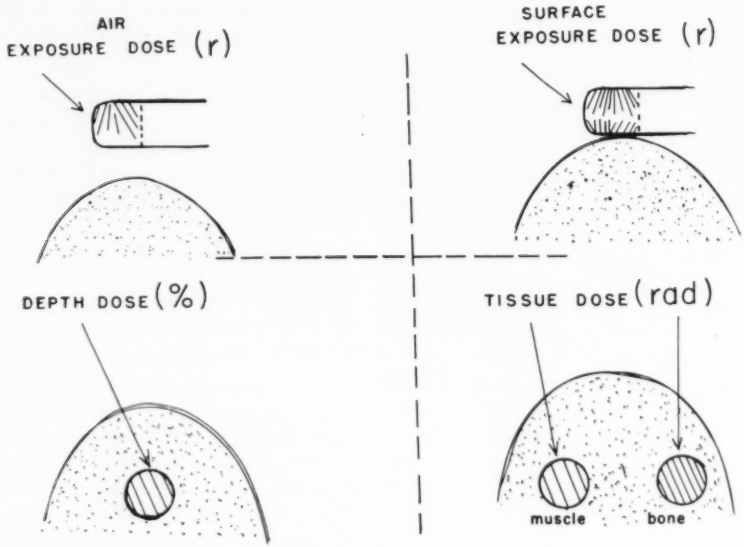


FIGURE 1.

depth dose in an ionization chamber, one can calculate the absorbed energy by the proper conversion factors, which necessitates knowing the absorption coefficient and the energy required to produce an ion-pair (in the particular tissue of interest). This absorbed energy in units of 100 ergs then is considered as the tissue dose in *rad*.

Some radiations are more biologically effective per rad than others. This relative effectiveness can be determined and the factor used to convert rads of some other type of radiation to that amount of x-radiation which would produce an equivalent effect. This rad times the relative biologic effectiveness (RBE) gives us the roentgen equivalent man (REM), or the RBE dose.

It is recognized in instances that exposure to a large field is biologically more effective than the same exposure to a small volume. Thus, one realizes that the volume dose is important. In case a particular volume is homogenously irradiated, one can simply multiply the grams by the exposure dose to obtain what we call the volume dose in gram roentgens. If the volume is not homogenously irradiated, one has to determine one or more depth doses and then integrate the volume dose to get one so-called integral dose.

Protraction of radiation exposure is decreasing the roentgen per minute but it still may be a continuous exposure. *Fractionating the exposure* is breaking up the exposure with a number of periods of no irradiation.

BIOLOGIC ACTION OF IONIZING RADIATION

The steps in the production of a biologic effect are (1) the production of ionization, (2) the formation of active radicals, and (3) the production of toxic compounds. The increase in gene muta-

tion rate may be considered as due to a very early step in the absorption of energy, for it is not affected much by protraction or fractionation, by temperature or other environmental factors. Chromosomal aberrations are also the result of fundamental changes but may be more comparable to changes produced by chemicals and other agents. The number of these chromosomal abnormalities may be altered by protracting or fractionating the exposure or by changing the temperature or other environmental factors during the exposure. A delay in cell division, the production of abnormal cell division, the impairment of cell functions, lysis, degeneration and death may be the result of many steps in absorption of energy and may be a combination of effects including those which are similar to ones produced by toxic chemicals and other deleterious agents. In these latter types of damage we find a threshold dosage, a steep dose effect curve once the threshold has been exceeded, and a rapid attainment of maximum damage as the exposure is increased.

VARIATION IN RADIOSENSITIVITY OF CELLS

If one is studying the effects of radiation on cell division and development, it will be observed that changes occur with lowest doses, and most rapidly, in cells that are beginning to divide. Likewise, one will see these changes more frequently in those tissues which are undifferentiated and are in the state of cell multiplication and differentiation.

TRUE AND PSEUDO RECOVERY

If the dose is not too high, cells may recover the ability to divide and may live a fairly normal life span. Likewise, if the number of damaged cells in a tissue is not excessive, these may be replaced in time. On the other hand, tissues may appear to be normal due to the influx of cells from unirradiated areas; in many cases organs may appear to be normal, whereas histologically they would reveal many areas of fibrosis and other types of replacement of epithelial cells by connective and nonfunctioning tissue.

MODIFICATION OF RADIOSENSITIVITY

The degree of response of tissues to irradiation may be affected by such things as the oxygen tension, vascularity, and temperature. Many tissues can be made more resistant by lowering oxygen and respiration during irradiation. Some chemicals have been found to afford some protection if present before and during the radiation exposure. Other substances, such as bone marrow and spleen extract, given after radiation exposures seem to accelerate the regeneration, and in many cases they appear to replace damaged cells by viable donor tissue. Much of this type of investigation is still limited to studies with animals.

IMPLICATIONS IN OPHTHALMOLOGY

Irradiation of the eye involves a wide variety in cells with regard to their degree of mitotic activity, metabolism and function. The cornea is in an area of rapid exchange of fluid and gases, and therefore is probably in a state of high metabolism. It would appear to be very radiosensitive, for cell division is impaired by relatively low doses and widespread damage may show up very rapidly after exposure. On the other hand, if damage has not been excessive and inasmuch as the regeneration capacity is high, recovery may soon be practically complete.

The lens, on the other hand, is possibly in an area of lower oxygen tension, is probably operating at a lower metabolic rate, and cell proliferation is rather slow. The bulk of the lens is of non-

nucleated material and the epithelium is proliferating principally at the margins near the area where the new fibers are being produced. The most noticeable effect of radiation in the lens is the production of abnormal fibers. These abnormal fibers and degenerating cells produce vacuoles and polar plaques. If the exposure is high enough, the degeneration continues to progress and produces complete opacity. The threshold dose for the production of cataracts by x-rays is rather high. Recovery between multiple exposures is slow, but unless the exposures are fairly close together and each one is quite high, the lens will recover and complete opacity will not be formed. On the other hand, some types of radiation, such as fast neutrons, may affect not only those cells getting ready to divide but all the cells. The cells of the epithelium may be permanently impaired so that multiple exposures cause an accumulation of injury. Eventually a complete cataract could form with an accumulated dose, although this same dose of x-radiation would not produce a cataract if it were fractionated.

The retina is susceptible to radiation damage and the threshold is not excessively high but the replacement of cells is rather good. The muscle and connective tissue of the eye are somewhat resistant as very little cell division is involved. The eyelashes and adjacent skin and bone are comparable in their reactions to similar tissues in other parts of the body. For example, bone and connective tissue withstand quite heavy exposure, but when such exposure is excessive and when damage does appear, recovery is very slow, if at all. The eyelashes and eyebrows are a little more resistant than the surface epithelium, but they too may be affected if the exposure is excessive.

REFERENCES

1. Behrens, Charles F.: Atomic Medicine, New York, Nelson, 1949.
2. Braestrup, Carl B., and Wyckoff, H. O.: Radiation Protection, Springfield, Ill., Charles C Thomas, 1958.
3. Ellinger, Friedrich Phillip: Medical Radiation Biology, Springfield, Ill., Charles C Thomas, 1957.
4. Evans, Titus C., and Lough, S.: Radiation protection. Chapter IV in Biologic Effects of Radiation, C. B. Braestrup, ed., Springfield, Ill., Charles C Thomas, 1958.
5. Glasser, Otto E. H.; Taylor, L. S., and Weatherwax, J. L.: Physical Foundations of Radiology, New York, Hoeber, 1954.
6. Hollaender, Alexander, ed.: Radiation Biology, New York, McGraw-Hill, 1954.
7. Low-Beer, Bertram V.: The Clinical Use of Radioactive Isotopes, Springfield, Ill., Charles C Thomas, 1950.
8. Nickson, James J., ed.: Symposium on Radiobiology, Oberlin College, 1950. The Basic Aspects of Radiation Effects on Living Systems, New York, Wiley, 1952.
9. Nuclear Science Series: Basic Mechanisms in Radiobiology. National Academy of Sciences-National Research Council, 1953, 1954, 1955, 1956, 1957.
10. Quimby, Edith Hinkley; Feitelberg, S., and Silver S.: Radioactive Isotopes in Clinical Practice, Philadelphia, Lea & Febiger, 1958.

EARLY LENTICULAR LESIONS RESULTING FROM IONIZING RADIATION

LUDWIG VON SALLMANN, M.D.

BETHESDA, MARYLAND

IN this paper, discussion is focused on certain early morphologic sequelae produced by the passage of ionizing radiations through living ocular tissue. The biologic changes follow, with varying latency, the events of primary ionization and activated chemical reactions. The causal relationship between the physical (direct) and biochemical (indirect) processes on one side and the biologic consequences on the other is unknown; moreover, radiation effects on critical enzyme systems or tissue metabolism have not as yet been demonstrated at times when incipient structural changes of eye tissues have clearly developed. At present, then, morphologic studies, on a cellular level, provide information on the earliest radiation-induced injury at a time when biochemical investigations fail to do so.

Because of clinical implications, as well as suitability for controlled cytologic analysis, systematic work on early lesions of ocular tissues resulting from exposure to ionizing radiations has been carried out most extensively on the lens. In this presentation the results of light microscopic and electron microscopic investigations of incipient cellular changes will be compared.

The initial microscopically discernible signs of cell injury that follow exposure of the eye to a dose of about 1500 r x-rays or smaller doses of high energy particles occur with the brief latency of about ten minutes (fig. 1).[9]

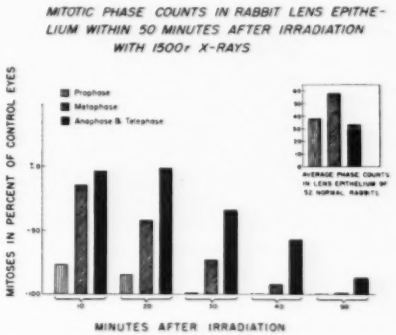

MITOTIC PHASE COUNTS IN RABBIT LENS EPITHELIUM WITHIN 50 MINUTES AFTER IRRADIATION WITH 1500r X-RAYS
Prophase
Metaphase
Anaphase & Telophase
MITOSES IN PERCENT OF CONTROL EYES
MINUTES AFTER IRRADIATION

FIGURE 1.

At this time the number of prophases in the epithelium is already decreased and approaches the zero level twenty minutes later. Metaphases and telophases show subsequently a progressive reduction in counts. The normal ratio of prophases, metaphases, and telophases is 50:100:50, and it undergoes a continuous shift, with the telophases disappearing last. At a dose level of 1000 to 1500 r x-rays, the mitotic activity reaches zero about fifty minutes after irradiation.

From the Ophthalmology Branch, National Institute of Neurological Diseases and Blindness, National Institutes of Health, Public Health Service, U. S. Department of Health, Education and Welfare, Bethesda 14, Maryland.

Presented at the Sixty-Third Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 12-17, 1958, Chicago.

During these fifty minutes and as soon as twenty minutes after exposure, the dividing cells show chromatin bridges in anaphase and telophase, a phenomenon which is assumed to be caused by radiation-induced stickiness of chromosomes (fig. 2). The brief latency of the biologic effect has been explained as the time required for interaction of physical with biochemical factors and, in addition, as the time span necessary for the development of visible signs of biologic damage. The duration of mitotic suppression is dose dependent. Figure 3 summarizes the data on dose-effect relation for 125, 250, 500, 1000 and 2000 r x-rays. After exposure to 1000 r, dividing cells are absent for four days. The inhibition lasts six days when the dose is doubled. The time required for recovery to a normal level of cell division also depends on the dose, as does the extent of the subsequent overcompensating increase in mitotic cell counts.

Of greater cytopathologic significance than the effects on mitosis are the early signs of injury to cell constituents seen under the light microscope. They consist of clumping of chromatin and extrusion of globular Feulgen-positive substance from the nucleus into the cytoplasm, and later into the extracellular space (fig. 4). One or two days after

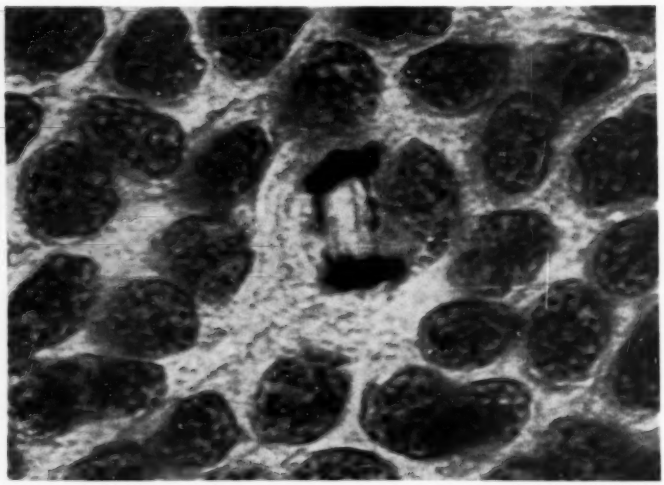


FIG. 2—Chromosome bridges in dividing cell of rabbit lens epithelium twenty minutes after irradiation.

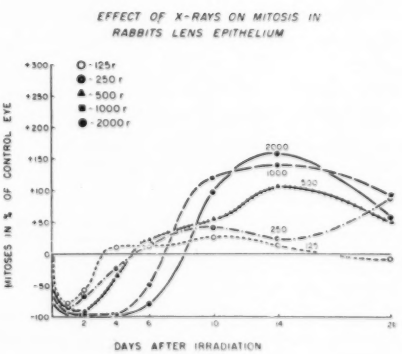


FIGURE 3.

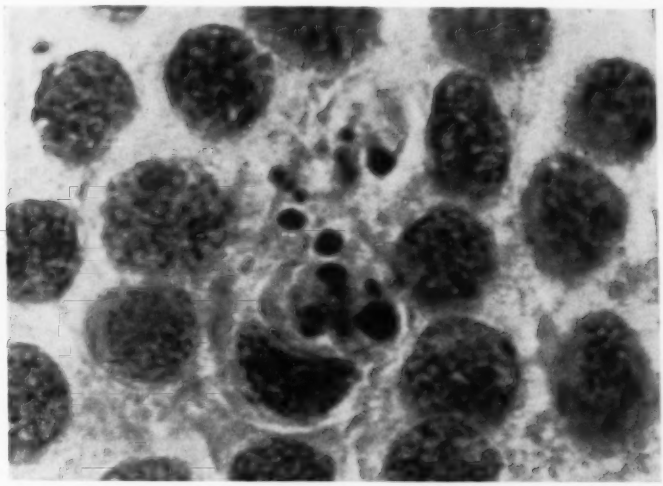


FIG. 4—Elimination of clumped chromatin from epithelial cells of irradiated rabbit lens.

irradiation, this damage implicates only a few epithelial cells in the germinative zone, but it increases most rapidly at the period of the overshooting mitotic activity (fig. 5). Many of the degenerate nuclei derive from abnormally dividing cells which show fragmentation and transposition of chromosomes, or other chromosomal aberration (fig. 6), but clumping and elimination of chromatin material from the nucleus occurs also in cells which are not dividing, or during the phase of mitotic suppression.

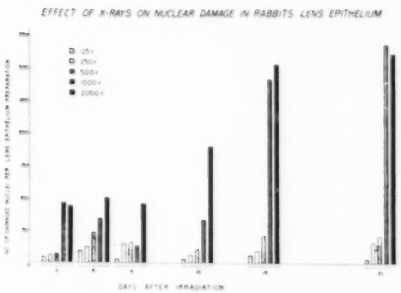


FIGURE 5.

The number of injured cell nuclei increases with the dose up to 1000 r x-rays. Beyond this, it appears that a saturation level is reached, since the use of 2000 r x-rays does not result in a further rise in the number of degenerate cells (fig. 5). A number of damaged cells undergo complete destruction, which is reflected in a relative sparseness of the cell population of the germinative zone in later stages. Other nuclei apparently suffer only small losses of chromatin substance.

Such cells may recover, survive, divide and differentiate. It is possible, however, that their daughter cells of the next or later generations do not develop to healthy fibers, which in turn could produce cataractous changes after long periods of time.

As a rule, the signs of damage to the cytoplasm are not visible with the light microscope within three weeks after radiation with a medium dose of x-rays. This apparent discrepancy in the onset of nuclear and cytoplasmic changes vanishes when the material is subjected

to electron microscopic examination. In the laboratories of the Ophthalmology Branch of the National Institutes of Health, Dr. T. Wanko studied the lens epithelium of rabbits, four, ten, and fourteen days after exposure of the eye to 1500 r x-rays. I am indebted to this investigator for a series of electron micrographs (figs. 7 to 13).

mentous elements in the cytoplasm previously described by Wanko and Gavin.[10] The mitochondria seem swollen and empty and show ballooning of their contour (figs. 8 and 9). The granularity of the nucleoplasm is increased, and nuclear material can be discerned lying outside the nucleus in the cytoplasm (figs. 10 and 11). This picture corresponds to that

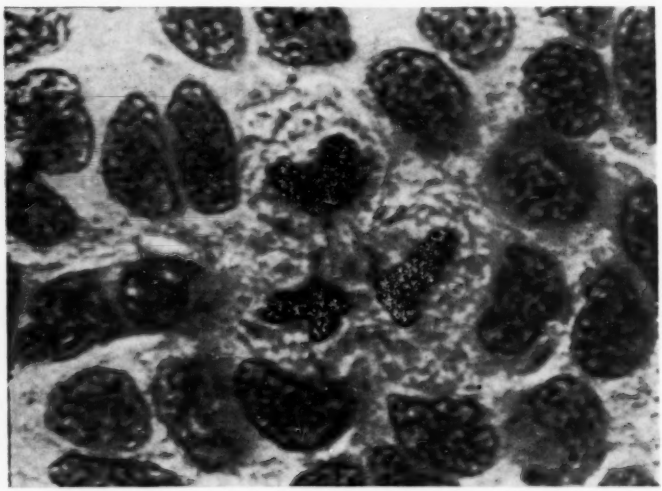


FIG. 6—Tripolar mitosis in epithelium of irradiated rabbit lens.

Only a few of the more frequently observed radiation-induced changes will be mentioned. Similar to the usual microscopic picture, signs of cytopathologic changes are present at some sites, whereas neighboring cells do not deviate from the normal. Four days after irradiation, long lamellated structures are occasionally seen in the cytoplasm (fig. 7). The nuclear membrane seems to undergo some structural alteration at this early stage, but further studies are necessary to establish this firmly. At the tenth day there is an increase of the filaof nuclear fragmentation observed with the light microscope. The nucleolus assumes an organized pattern resembling that seen in bow nuclei in contrast to its amorphous shape in normal epithelial cells. At the two-week period, a marked diminution of cytoplasmic structures is obvious; it occurs together with the accumulation of ribonucleic acid granules at circumscribed sites (fig. 12). The granular structures of the nucleoplasm now show clumping and are detached from the nuclear membrane. The latter is thicker than normal and there are gaps

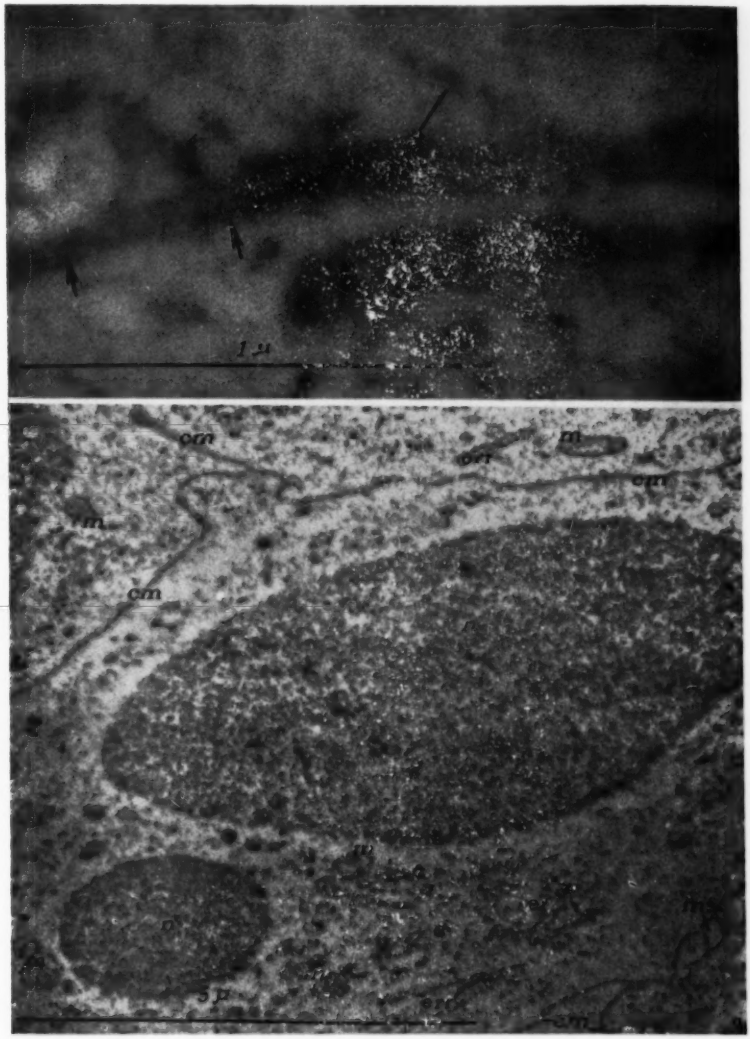


FIG. 7—Rabbit lens epithelium. Peripheral zone. Four days after irradiation (1500 r). During this phase, a structure (w) composed of several dense profiles in a lamellar arrangement (arrow) is observed in the cytoplasm. It may attain a maximal length of 4 μ. A cluster of dense granules (ribonucleoprotein) is indicated at g. (Electron micrograph, approximately 86,000 ×)

FIG. 8—Rabbit lens epithelium. Peripheral zone. Ten days after irradiation (1500 r). This micrograph shows one large (n) and one small (n′) dense, nuclear region encompassed in a single cell. The nucleoplasmas are identical, both being characterized by a finer, more granulated appearance than is usual. Cytoplasmic constituents are indicated as mitochondria (m), rough surfaced endoplasmic reticulum (err), smooth surfaced endoplasmic reticulum (er), cell membranes (cm) and interdigitations (int). (Electron micrograph, approximately 16,600 ×)

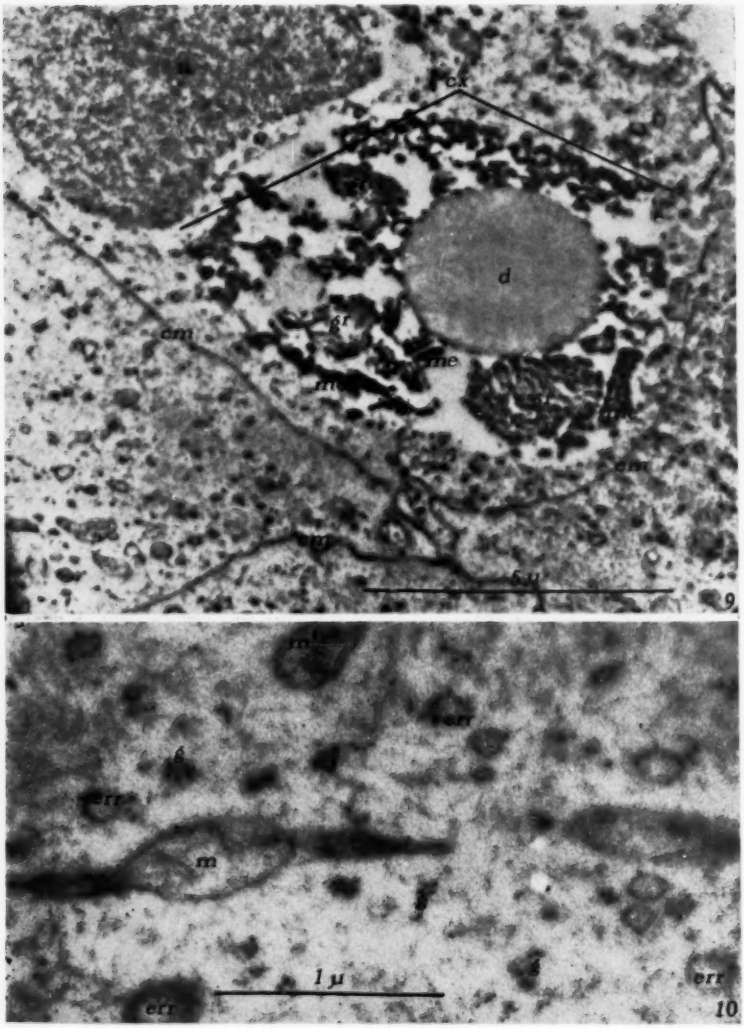


FIG. 9—Rabbit lens epithelium. Peripheral zone. Ten days after irradiation (1500 r). In this cell a complex (cx) of abnormally dense elements is seen opposite the nucleus (n) and occupies a considerable portion of the cytoplasm. Opaque membranous (me) and granular (gr) profiles without any apparent organizational pattern are congregated around a center of homogeneous, ovoid density (d). There appear to be no regular cytoplasmic constituents within the complex; however, its boundary in relation to the rest of the cell is ill defined. Cell membranes (cm) are marked. (Electron micrograph, approximately 11,700 ×)

FIG. 10—Rabbit lens epithelium. Peripheral zone. Ten days after irradiation (1500 r). A mitochondrion (m) can be identified in conjunction with a lamellated structure analogous to those seen in figure 7. Clusters of dense granules (g), rough surfaced endoplasmic reticulum (err) and other mitochondria (m′) are present in the cytoplasm. (Electron micrograph, approximately 43,000 ×)

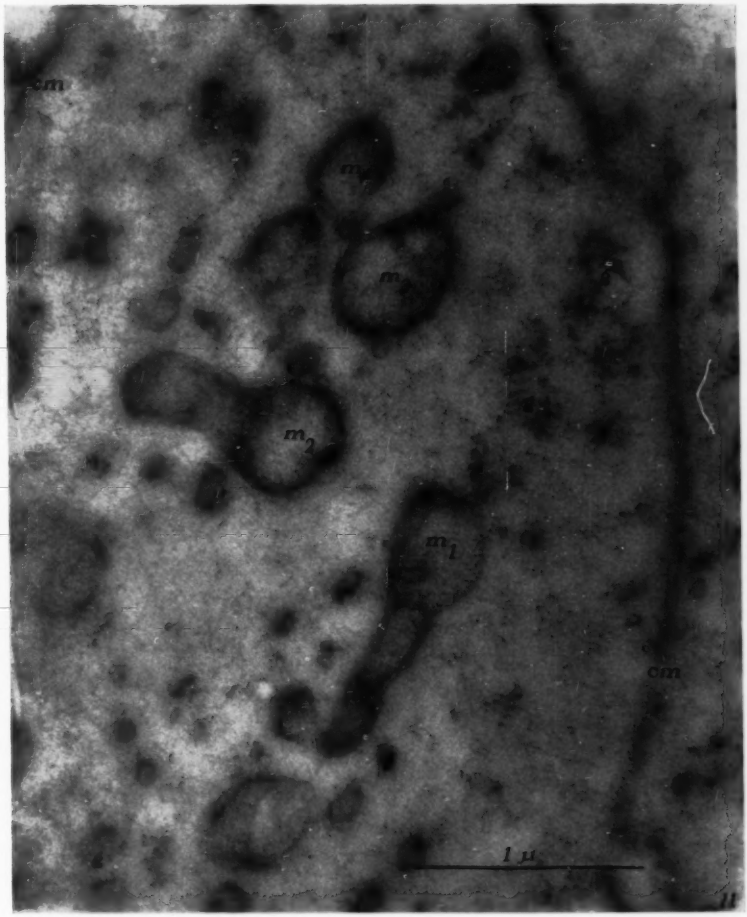


FIG. 11—Rabbit lens epithelium. Peripheral zone. Ten days after irradiation (1500 r). Several mitochondria can be seen in longitudinal (m_1, m_2) and transverse (m_3, m_4) sections. They exhibit certain characteristics by which they deviate from the normal appearance, i.e., increase in length (m_1), club-shaped contour (m_1, m_2), and sparseness of internal cristae (m_2, m_3). Other cytoplasmic elements are identified as cell membranes (cm), and dense granules (g). (Electron micrograph, approximately 43,000 ×)

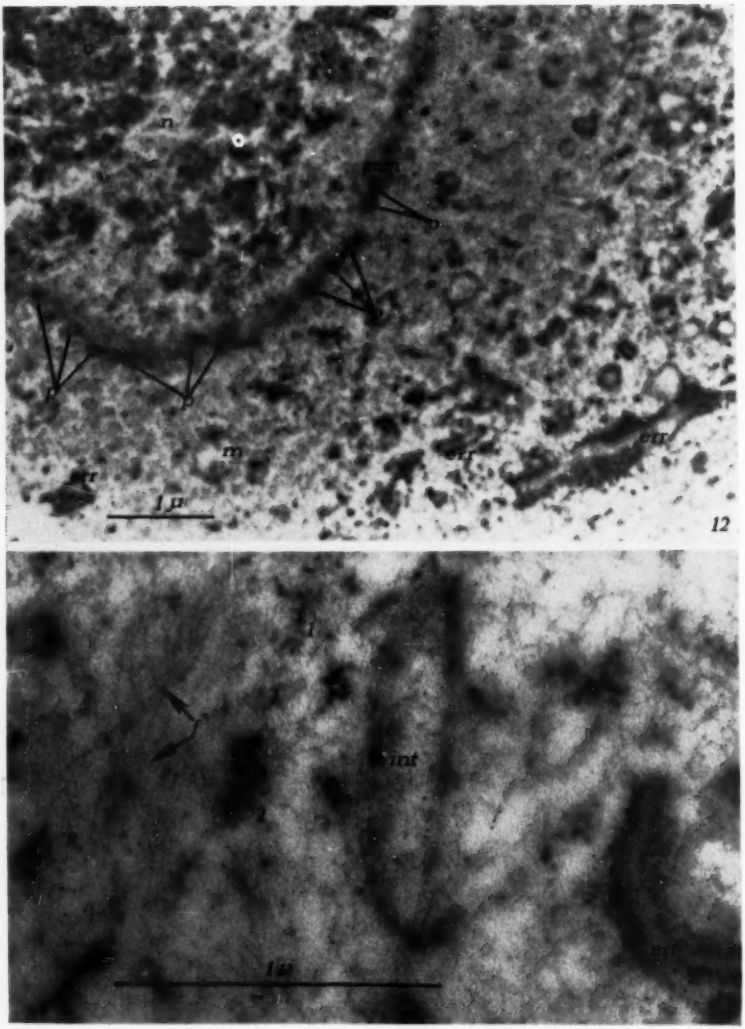


FIG. 12—Rabbit lens epithelium. Central zone. Fourteen days after irradiation (1500 r). The nucleus (n), occupying the left half of this picture, is outlined by a band-like structure (nm) only slightly denser than the adjacent protoplasm. Many opaque circular profiles (p) can be observed along this nuclear boundary and may represent uncommonly large stomata (approximately 500 Å). Clumps of dense granular material (c) are seen in the nuclear matrix detached from the surrounding membrane. The cytoplasm displays a sparseness of mitochondria (m) and an abundance of rough surfaced endoplasmic reticulum (err). (Electron micrograph, approximately 20,700 ×)

FIG. 13—Rabbit lens epithelium. Central zone. Fourteen days after irradiation (1500 r). The filamentous component (f) in the ground substance of the cytoplasm is considerably increased in quantity as compared with its distribution in normal lens epithelial cells. Many dense granules appear either widely scattered (g_1) or aggregated into clusters (g_2) or affixed to membranes (g_3) as part of the rough surfaced type of endoplasmic reticulum (err). An interdigitating cell process is indicated (int). (Electron micrograph, approximately 62,200 ×)

in its continuity (fig. 13). On the basis of these electron microscopic observations, the generally held opinion of a primary change of the cell nucleus followed by relatively late damage to the cytoplasm has to be corrected.

The described early effects on mitosis and on cell degeneration are predominant in a pre-equatorial zone of the epithelium, approximately 2 mm. broad, which represents the germinative area. Under normal conditions this part contains about 600 times more dividing cells than the large central portion of the monolayered epithelium.[7] The greater radiosensitivity of this zone, then, may be linked to its proliferative capacity, corresponding to observations in other tissues.

Two experimental approaches have been used to demonstrate directly the differences of vulnerability of various regions of the lens epithelium to ionizing radiations. In one approach, lead shields with different cutouts were fastened to the eye before it was placed in the x-ray beam.[1-6] In the other, high energy particles were directed through appropriate apertures to selected parts of the lens.[9] These particles exhibit less scattering than x-rays and allow aiming of the beam at circumscribed sites. Cytologic studies have been carried out only with the second technique.

The composite graph (fig. 14) illustrates the results of bombarding the rabbit lens with 2000 rep deuterons. With a centrally located aperture the germinative zone is outside the beam. In this case the depression of mitosis does not exceed 50 per cent of the counts of the control eye and recovery is complete on the fourth day. Irradiation of the germinative zone through a ring aperture results in complete inhibition of cell division for six days and it takes fourteen days before a normal mitotic count is reached. The number of degenerate cells rises to values four to ten times greater than those obtained in lenses exposed through the central aperture. In line with these microscopic observations is the relative incidence of cataract formation when central or peripheral parts of the lens have been irradiated.

Some data dealing with the dependence of cataract development on the number of injured cells have been reported in studies on effects of topical beta particle treatment with the widely used

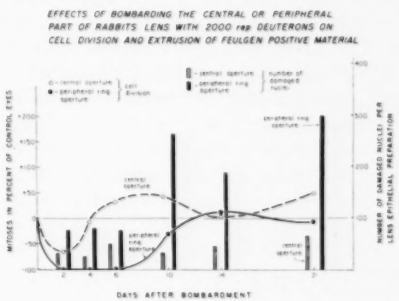

EFFECTS OF BOMBARDING THE CENTRAL OR PERIPHERAL PART OF RABBITS LENS WITH 2000 rep DEUTERONS ON CELL DIVISION AND EXTRUSION OF FEULGEN POSITIVE MATERIAL
MITOSES IN PERCENT OF CONTROL EYES
NUMBER OF DAMAGED NUCLEI PER LENS EPITHELIAL PREPARATION
DAYS AFTER BOMBARDMENT

FIGURE 14.

strontium 90 applicator.[8] When this radiation source is placed in the region of the rabbit's limbus, it has been shown that a surface dose of 5000 rep injures about forty cell nuclei and causes sector-shaped cataract. The latency period varied from six to ten weeks. Recovery from this damage has not been studied in these experiments, but observations of irradiation effects on partially shielded lenses[4,6] point to the possibility that the opacification might undergo regression. It should be stressed, however, that results obtained on rabbits do not permit conclusions as to responses to similar doses in the human eye, because the development of cataract following injury of various kinds differs greatly between species.

In this discussion practical applications of exposure to ionizing radiations are expected rather than academic considerations of radiobiologic problems. A question can be raised, therefore, regarding the inference to be drawn from observations of early cytopathologic events during radiotherapeutic procedures or accidental exposure of the eye to ionizing radiations. It is evident that such radiations applied in a sufficiently high dose produce immediate and, as a rule, irrevocable changes in lens tissue which can lead to cataract formation, although other ocular tissues escape signs of permanent damage. The long latency of clinical signs of this damage should not create a feeling of undue security in radiotherapeutic procedures. Unfortunately, in the history of radiation treatment, this has been the case over and over again. Knowing the sequence of events on a cytologic level, one wonders whether the indications for radiation therapy, particularly of non-neoplastic ocular diseases, should not be critically re-evaluated.

It has been shown that direct or indirect injury to cell nuclei is dose dependent. The difference in radiosensitivity of various parts of the lens epithelium deserves full consideration when ionizing radiations of limited penetration are topically employed. Some comprehension of the dose dependency of radiation injury and of the relative sensitivity of zones of the lens epithelium is essential for treatment of eye tissue with this physical agent. For local beta ray therapy, the knowledge of the distance of the lens equator from the outer coat is of the greatest importance. Without cognizance of these facts, the serious complication of a therapeutically produced radiation cataract is unavoidable.

REFERENCES

1. Alter, A. J., and Leinfelder, P. J.: Roentgen-ray cataract: Effects of shielding of the lens and ciliary body, A.M.A. Arch. Ophth., 49:257-260 (March) 1953.

2. Goldmann, H., and Liechti, A.: Experimentelle Untersuchungen über die Genese des Röntgenstars [Experimental investigation of the etiology of roentgen cataracts], von Graefes Arch. Ophth., 138:722-736, 1938.

3. Leinfelder, P. J., and Riley, E. F.: Further studies of effects of x-radiation on partially shielded lens of rabbit, A.M.A. Arch. Ophth., 55:84-86 (Jan.) 1956.

4. Pirie, Antoinette, and Flanders, P. Howard: Effect of x-rays on partially shielded lens of the rabbit, A.M.A. Arch. Ophth., 57:849-854 (June) 1957.

5. Puntenney, Irving, and Shoch, David: The ciliary body in radiation cataract, Am. J. Ophth., 38:673-681 (Nov.) 1954.

6. Richards, R. D.; Riley, E. F., and Leinfelder, P. J.: Lens changes following X-irradiation of single and multiple quadrants, Am. J. Ophth., 42:44-51 (Oct., pt. 2) 1956.

7. von Sallmann, Ludwig: Experimental studies on early lens changes after roentgen irradiation. III. Effect of x-radiation on mitotic activity and nuclear fragmentation of lens epithelium in normal and cysteine treated rabbits, A.M.A. Arch. Ophth., 47:305-320 (March) 1952.

8. von Sallmann, Ludwig; Munoz, Carmen M., and Drungis, Anne: Effects of beta irradiation on the rabbit lens, A.M.A. Arch. Ophth., 50:727-736 (Dec.) 1953.

9. von Sallmann, Ludwig, et al.: Effects of high-energy particles, x-rays, and aging on lens epithelium, A.M.A. Arch. Ophth., 54:489-514 (Oct.) 1955.

10. Wanko, Theodor, and Gavin, Mary Ann: The fine structure of the lens epithelium. An electron microscopic study, A.M.A. Arch. Ophth., 60:868-870 (Nov.) 1958.

RADIOTHERAPY OF LESIONS OF THE ORBIT AND OCULAR ADNEXA

MILFORD D. SCHULZ, M.D.
BOSTON, MASSACHUSETTS

BY INVITATION

My part in this symposium, which deals with the therapeutic application of ionizing radiation to diseases lying within the ophthalmologist's area of concern, is that of a clinical radiotherapist. I shall, accordingly, discuss the usefulness of radiotherapy in dealing with those diseases of the orbit and ocular adnexa which are either primary ophthalmologic problems or problems secondary to systemic or remote disease. My assignment has been to exclude diseases which are of the globe itself, which will be dealt with by others on this panel.

The principal role of radiotherapy in dealing with situations of concern to the ophthalmologist is the treatment of malignant neoplasms. In this field radiotherapy stands equal to surgery, in many instances, as a curative method. The indications for its use are well defined, and it should be employed only in those instances in which the nature of the disease is known and the effectiveness of radiotherapy has been demonstrated.

For reasons peculiar to the situation, the use of radiotherapy when cure can be promised with reasonable certainty is more limited in treating neoplasms of the orbit than in treating lesions elsewhere in the body. With few exceptions, primary neoplasms arising within the orbit are not radio-curable either because of their nature or because by the time they are seen by the radiotherapist they have extended beyond the orbit and all that can be hoped from treatment is palliation. Benign processes in general are not radiosensitive and should not be so treated. Neoplasms which by experience are known to be insensitive to irradiation or incurable by radiotherapy should only in exceptional instances be dealt with by radiotherapy.

CARCINOMA OF THE EYELIDS

In the treatment of early carcinoma of the eyelid, whether it be basal or squamous cell carcinoma, radiotherapy finds its greatest area of usefulness. These tumors are essentially skin cancers; in theory they should be controlled with almost complete certainty, though in practice only about 90 per cent are effectively controlled. The argument for radiotherapy is that by this means the disease can be controlled with almost no residual cosmetic defect or disability.

When the tumor is more advanced and tissues have been destroyed, control of the disease by radiotherapy is still in the same order of likelihood, but the defect is more pronounced. Although destroyed tissues cannot be replaced, the result is usually not unacceptable and certainly the period of disability is less than that required for reconstructive surgery following surgical removal. In

From the Department of Radiology, Massachusetts General Hospital, Boston.

Presented at the Sixty-Third Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 12-17, 1958, Chicago.

most of these instances radiation therapy is probably the treatment of choice.

When the disease involves the inner canthus and surgical removal would mean either plastic repair or damage to the lacrimal duct, radiotherapy can often effect both a good functional and a good cosmetic result with control of the disease equal to that produced by a surgical operation. Tumors of the canthi tend to invade the bony orbit rather early, especially at the inner canthus; when this occurs, control by radiation therapy is less likely than by surgical intervention. Accordingly, when canthal lesions are fixed to the bone, radiotherapy may, in general, be said to be less desirable than surgical removal. However, if one wishes to avoid a rather extensive resection, especially in an elderly patient, radiotherapy can be attempted with some hope of success.

When the tumor is longstanding, neglected, or recurrent, or when it has invaded the orbit, fixed the globe or extended extensively into the soft tissues about the globe, the ideal treatment is exenteration with sacrifice of whatever tissues may be necessary. Control by radiation therapy under these circumstances is uncommon—about 25 per cent, but even in these cases surprising results do occur occasionally following radiotherapy. This form of treatment may be useful in selected cases, especially when the patient is elderly, when he cannot or will not tolerate extensive surgical procedures, or when the situation is obviously hopeless and palliation is all that can be offered.

Metastases from carcinoma of the eyelids occur in about 10 per cent of those lesions capable of metastasizing and always carry a grave prognosis. Such metastases are surgical problems, and radiotherapy, as a rule, is reserved only for palliation.

Adenocarcinomas, nevocarcinomas, and melanomas in general may be considered to be radioresistant, and radiotherapy should be reserved only for those instances in which curative surgical procedures cannot be offered for some reason or will not be accepted, though an occasional tumor in one of these classes is found to be radiosensitive.

It is of utmost importance in dealing with all orbital neoplasms that the first therapeutic course be so chosen and planned that it will succeed. There is no chance to cure a neoplasm like a first chance, and radiotherapy is not a means of improving the result of unwisely chosen and poorly executed surgical removal, nor should surgical procedures be used by the radiotherapist habitually as a cleaning up device (table I).

MALIGNANT LYMPHOMA AND HODGKIN'S DISEASE

Involvement of the orbit by malignant lymphoma and Hodgkin's disease as a part of the picture of generalized disease is not uncommon and is dealt with as lymphoma in general, in the treatment of which radiotherapy plays an important role. Rapid invasion of the orbit by lymphomatous disease with the production of an exophthalmos constitutes one of the few emergencies in radiotherapy. Prompt treatment by irradiation fortified by appropriate chemotherapy is required if loss of vision is to be avoided. Complete recession of the globe does not always follow, but this does not necessarily indicate the presence of residual disease.

A curious type of episcleral or conjunctival infiltration occasionally seen by the ophthalmologist is histologically indistinguishable from malignant lymphoma. Some of these infiltrations are

TABLE I

RESULTS OF TREATMENT IN CARCINOMA OF THE EYELID

(M. G. H.: 30 MONTHS OR MORE)

CLASS	TOTAL	FAILURE	CONTROLLED BY RADIOTHERAPY	CONTROLLED BY SECONDARY OPERATION
1	80	2	73	5
2	76	4	71	1
3	9	6	2	1

Class 1—Small, noninfiltrative lesions which usually involve the palpebral margins.

Class 2—Tumors which infiltrate the lid and destroy tissue.

Class 3—All others.

primary, are unassociated with lymphomatous disease elsewhere, and are characterized by long periods of freedom from disease following removal. These respond exceedingly well to radiotherapy. Small doses of radiation have been found to produce involution of the infiltration. If the infiltration is unassociated with generalized lymphoma, the patient may then be expected to remain well.

TUMORS OF THE LACRIMAL GLAND

Lacrimal gland tumors have histologic characteristics similar to those of tumors of the salivary gland, ranging from completely benign to highly malignant. They tend to grow slowly and painlessly for a long time, and when they are finally seen by the physician, they have often already invaded the bone and extended into the skull. Some of the less well differentiated tumors are quite radiosensitive, but by and large the less malignant and the benign lacrimal gland tumors are radioresistant and curative treatment lies with radical surgical removal.

Occasionally radiotherapy can produce respite for a long time. At times irradiation effects a cure following incomplete removal or inoperable recurrence of a radiosensitive tumor, but generally speaking radiotherapy serves for palliation alone. Some pulmonary metastases from carcinoma arising in the lacrimal gland are exceedingly radiosensitive; this constitutes one of the few instances in which treatment of pulmonary metastases by radiotherapy for palliation is warranted.

ORBITAL SARCOMAS

Sarcomas arising in the orbit are of indifferent radiosensitivity; any hope of cure of these processes lies with radical surgical removal. Occasionally some palliation of recurrent and inoperable disease may be effected by radiotherapy, but even this is usually disappointing.

METASTATIC MALIGNANT TUMORS

Metastases to the orbit from primary tumors elsewhere in the body are not uncommon and the susceptibility of the metastatic lesion to radiotherapy is the same as the radiosensitivity of the primary tumor. There is no point in trying to irradiate metastatic lesions which spring from primaries known to be radioresistant. Even when the sensitivity

of the lesion is known, palliation is all that can usually be offered.

NEUROBLASTOMAS

Neuroblastomas are peculiar in their propensity to metastasize to the orbit, producing the Hutchinson syndrome of classic literature. The situation is almost invariably hopeless and palliation is all that should be sought. These tumors are very radiosensitive, and it is often surprising how much comfort and cosmetic improvement can be effected by a minimal amount of radiation.

DIRECT EXTENSION OF THE NEOPLASMS TO THE ORBIT

The orbit is frequently involved by direct extension of neoplasms growing in the immediate vicinity. When carcinoma of the nasal accessory sinuses invades the orbit, the prognosis is grave and radical radiotherapy is usually relied upon as the method of treatment. In these instances exenteration is often indicated in order to provide access to the field of irradiation. To try to protect the globe from irradiation when the orbit is involved is almost always futile. Tumors primary in the central nervous system which have extended to the orbit, meningiomas, some gliomas — especially those arising in the optic tract—are not sufficiently susceptible to radiation to justify the procedure. Some improvement in survival is reported when radical surgical removal is followed by radiotherapy in the treatment of gliomas of the optic tract, but this is difficult to assess and we must accept surgical removal as the treatment of choice.

BENIGN NEOPLASMS

Benign neoplasms arising in the orbit, such as dermoids and epithelial cysts, are in no way affected by radiotherapy and should never be treated in this way.

MIKULICZ' DISEASE

The orbital swelling in so-called Mikulicz' syndrome occurs as the result of inflammatory and neoplastic processes, the most common of which is lymphomatous disease. There are, however, a few cases which are classified as true Mikulicz' disease, and these have been found to respond to radiotherapy in much the same fashion as malignant lymphomas and are treated in the same way.

KELOIDS

The management of keloids arising in the skin about the orbit and eyelid is often a problem. Involution of the keloid can be produced by irradiation, but the amount which is necessary is usually more than one desires to give otherwise normal structures. Occasionally, when there is no alternative, radiotherapy is useful in the treatment of keloids, but its routine use is inadvisable.

VASCULAR TUMORS

X-rays and gamma rays have been used rather extensively in the past in the treatment of vascular tumors arising in the orbit as well as elsewhere in the body, but in general these tumors are not problems for radiotherapy. Lymphangiomas are not responsive to irradiation in any degree. The neurocutaneous variety of vascular tumors called port-wine stains are completely radioresistant and must never be so treated. Deep cavernous hemangiomas are usually best treated by other methods which give less risk of damage to the eye.

Capillary hemangiomas involving the orbit and lids are classically treated by irradiation, but most of these, if left alone, will regress spontaneously within a year or so. They must not be neglected, however; if the tumor is so large that it interferes with vision, permanent loss of sight and of muscle function may occur

and acceleration of the healing process must therefore be provoked. This can be done by judicious radiotherapy, but usually it is better done by injection of a sclerosing solution or electrocoagulation, which jeopardizes the eye less. If radiotherapy is elected, and there is no question but that it does accelerate the healing process, extreme care must be taken to avoid damage to the globe and the dose must be minimal.

PITUITARY TUMORS

The ophthalmologist often has occasion to deal with pituitary tumors because of the visual defects they produce. Relief of symptoms, regression or cessation of progress of the visual field defect is a frequent accompaniment of radiotherapy to the pituitary, and most neurosurgeons now accept radiotherapy as preferable to immediate surgical intervention. Transient edema sometimes occurs during the course of radiotherapy, with increase in the visual defect. The ophthalmologist should be on the lookout for this and should warn the radiotherapist that the course should be either interrupted or retarded so as to avoid risk of further damage to vision.

METABOLIC AND INFLAMMATORY LESIONS

Of the metabolic and inflammatory processes which produce changes in and about the orbit, only a few of the histiocytoses, such as Hand-Schüller-Christian disease and eosinophilic granuloma, are quite radiosensitive and respond favorably to very modest doses of x-ray. These should never be treated excessively.

Other inflammatory lesions, including the so-called pseudotumor, which produce exophthalmos and other changes in the orbit are mentioned only to be dismissed as far as radiotherapy is concerned. The important thing is to recognize these processes for what they are and shun the so-called therapeutic trial of radiation.

MALIGNANT EXOPHTHALMOS

The exophthalmos accompanying Graves' disease has repeatedly been reported as showing favorable response to irradiation. In general these responses are inconsistent and most observers find the results of radiotherapy in treatment of this disease disappointing. As an act of desperation, however, one is probably justified in trying radiotherapy, but with guarded expectation of success.

HERPES

Radiotherapy has been extensively tried in the treatment of postherpetic pain and of the active disease process. Results have been almost uniformly disappointing, and continuance of this method of management should not be condoned.

DERMATOSES AND CONJUNCTIVITIS

There are many dermatoses of the eyelids and inflammatory and allergic changes of the palpebral conjunctiva which respond quite favorably to minimal amounts of radiation. In fact, they respond so favorably that one is tempted to use irradiation instead of correction of the basic defect; for example, vernal conjunctivitis. Irradiation is generally eschewed in the treatment of these processes; however, because it does not cure, it alleviates only transiently, and repeated applications of radiation can result only in eventual damage. Other means of dealing with these processes are effective and much less likely to produce late unfavorable sequelae.

The treatment of non-neoplastic diseases by radiotherapy has in recent years come under critical scrutiny, and considerable thought must be given before ad-

vising its use in these cases. As years go by the indications become more and more circumscribed.

One must conclude from this that the radiotherapist plays a rather limited but nonetheless important role in the management of disease processes of the ocular adnexa and about the orbit, its principal advantage being in early and noninvasive epithelial neoplasms of the lid. Because of the ease of application, excellence of cosmetic result, and the economy of both time and money, many consider radiotherapy to be the treatment of choice in these cases. In the management of pituitary tumors, a few of the lipohistiocytoses, and malignant lymphomas, radiotherapy is also preferred to other methods of management. In most other situations, however, radiotherapy is either ineffective or useful only in the palliation of incurable and recurrent disease.

RADIOTHERAPY OF OCULAR LESIONS BY X-RAYS AND GAMMA RAYS

ARNOLD W. FORREST, M.D.

NEW YORK, NEW YORK

IONIZING electromagnetic rays are available in a spectrum which permits effective penetration to be limited to the most superficial layers or to reach the deepest parts of the eyes. A graph (fig. 1) showing the percentage of surface dose which is present at various depths for various energies of x-ray under a particular set of experimental conditions demonstrates the greater penetration with the higher voltage sources. From these data it is seen that it is possible by varying the energy of the source, within limits which are characteristic of each piece of equipment, to vary the distribution of the ionizing energy to increase or decrease its penetration. In x-rays generated at 250 kilovolts or lower, the dose in tissue decreases with increasing distances from source, so that at all times the tumor or other tissue to be treated must be more radiosensitive than the more superficial tissue. In the case of the supervoltage x-rays such as are produced by the betatron, the energy of the beam is so great and it penetrates so vigorously that the dose does not begin to fall at the surface but, contrariwise, rises until a characteristic depth of tissue is reached. If the tumor is more superficial than this point of highest energy, artificial tissue (bolus) placed upon the skin surface may be used to bring this point nearer the surface and the tumor.

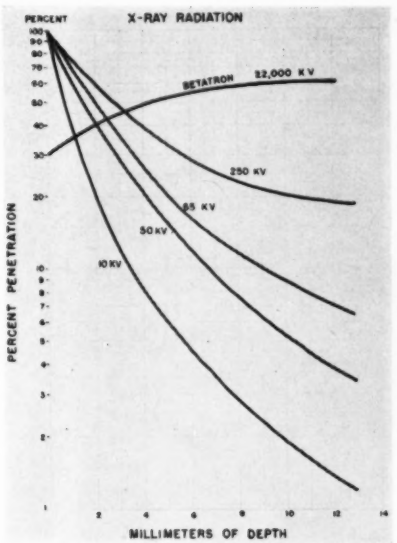


FIG. 1—Depth doses of several x-ray beams (unfiltered, theoretical).

Just as x-ray therapy can be administered from a distance, radium or other sources of gamma rays can be used in a similar manner. In the case of radium, too large and expensive a source would be necessary, so it is not commonly used in this way. More recently, synthetic radioactive isotopes such as cobalt (Co^{60})

From the Institute of Ophthalmology, Presbyterian Hospital.

Presented at the Sixty-Third Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 12-17, 1958, Chicago.

have made this type of gamma ray therapy a useful tool. However, if the source of gamma rays can be placed adjacent to the tumor, a large tumor dose can be safely administered. In ophthalmic therapy, gamma rays are more commonly derived from radon seeds or plaques of radium or Co^{60} applied directly to the eye.

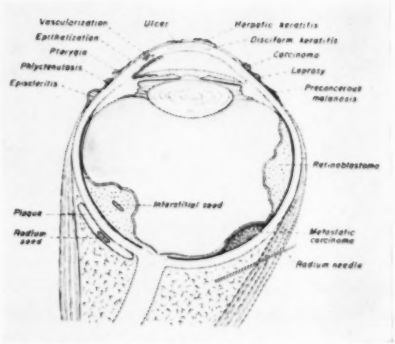


FIG. 2—Some ocular diseases treated with radiation (schematic).

I. TECHNIQUES

A. X-Ray Therapy

1. Grenz rays (very low voltage x-rays). In the diagram of a section of an eye (fig. 2) a variety of diseases are indicated for which radiation is useful. Correlation of the position of the several diseases with the chart that indicates the penetration of the various x-rays shows that for superficial diseases of the cornea and sclera, x-rays from a source of the order of 15 to 30 kilovolts, so-called grenz rays, are suitable and do not reach the deeper tissues (especially the sensitive lens) in significant concentration. Grenz rays are absorbed almost completely in several centimeters of air so that treatments can be given without additional protection to the operator beyond the use of lead-lined gloves. A spec-

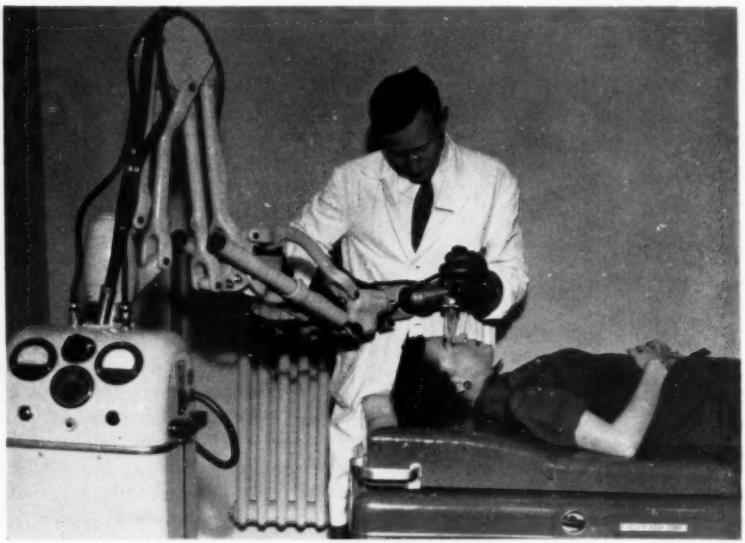


FIG. 3—Grenz ray method.

ulum is placed so as to separate the lids, the patient fixes his gaze, and the apparatus is adjusted to direct the treatment appropriately. Glass tubes, generally round, limit the treatment area (fig. 3).

2. Low voltage. Lesions of the anterior segment which are within the fibrous envelope of the eye are at a depth of several millimeters (fig. 2). X-rays generated at 60 to 120 kilovolts are useful in treatment of these lesions and in occasional instances have even been used in the treatment of anteriorly situated retinoblastoma. Appropriate lead shielding and treatment cones limit the area of exposure (fig. 4).

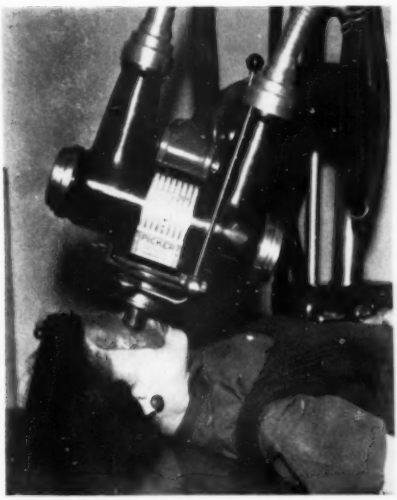


FIG. 4—Low voltage method.

3. High voltage. By the use of x-rays derived from sources with energies in the range from 200 to 250 kilovolts, it is possible to deliver effective doses to the deeper ocular tissues. Limiting cones are round or rectangular. Adult patients

FIG. 5—High voltage method.

are immobilized in sandbags and children are held by a parent or a castlike apparatus (fig. 5). Earliest workers directed treatment anteriorly through the cornea and lens, but today only oblique and lateral ports are used. In bilateral retinoblastoma the more involved eye is enucleated and the other eye is treated through a temporal and a contralateral nasal port.

4. Super voltage. By use of the betatron, x-rays of the energy of 22 million volts are obtained. In the treatment of eye disease the extreme penetration is not the only characteristic for which this type of radiation is chosen. Other favorable features are the sharp fall-off of radiation intensity at the edges of the field and the lower absorption at the surface, including skin and bone.

B. Gamma Rays

1. Therapy at a distance. Although radium sources are not commonly used, with the increasing availability of the Co^{60} apparatus, gamma ray sources at a distance are becoming popular in this country and could be used for ocular therapy.

2. Local therapy. The gamma rays of radioactive material, natural or syn-

thetic, are identical to the artificially generated x-rays of similar wave lengths.

A variety of techniques have been tried, but some of these have been quickly abandoned. In the early days radium needles were placed in the orbit through the lids, but the effect was too diffuse to be serviceable in the localized radiation required for the treatment of intraocular tumor.

Radon seeds have been placed directly in tumors within the eye.[30] The sclera was incised over the center of the neoplasm and the point of the knife passed through sclera and choroid and entered the base of the retinal mass. A radon seed was then placed in the tumor. Due to intraocular complications, this technique was abandoned in favor of suturing radon seeds to the sclera.[28] Plaques or discs containing radium salt or radioactive cobalt are now being used in an effort to treat the involved area more uniformly.[29] The placing of scleral sutures in the case of posteriorly located tumors is difficult, so several devices are used which will hold the radiation source over the tumor but which can be sutured more anteriorly. These are generally removed after hours or days, but radon seeds sometimes are designed in strength to remain *in situ*.[12,16,42,48]

Wire of radioactive tantalum has been used, applied in a plastic face mask or contact glass for treatment of retinoblastoma or precancerous melanosis of the conjunctiva.[44] Hollow needles containing radioactive tantalum wire have been passed into anterior and posterior chambers in treatment of iris melanoma.[22] Plastic bags containing radioactive iodine have been applied to the sclera, thus bringing a source of gamma rays close to the eye.[32]

II. OCULAR DISEASES TREATED WITH X-RAYS AND GAMMA RAYS

The sources of x-rays and gamma rays have been mentioned. For a given amount of ionizing radiation in tissue, the biologic effect is independent of the source. Clinical results are related only to the distribution of this radiation in the tissue.

Radiation has a limited function in ophthalmology. Many of the diseases which have been treated with radiation have an extremely variable course so that it is almost impossible to evaluate the therapeutic results except with treatment of many patients. In many instances medication and the passage of time have failed to produce a cure before radiation is used. This indicates the intractable nature of this disease, and it is perhaps not unexpected that radiation should join other therapeutic agents in failure.

A. Superficial Lesions

These lesions involve the cornea, conjunctiva and sclera. The prime problem in this therapy is to deliver an effective dose to the lesion without exposing the lens equator to a cataractogenic dose. There has been much discussion and some difference of opinion as to the threshold dose, and this dose varies with the time in which it is given. In a single exposure as little as 200 r (tissue dose) has produced a cataract, while in protracted therapy in periods between three weeks and three months, up to 1000 r has been given without cataract formation. An average figure of 500 r is accepted as the cataractogenic threshold.[25]

1. Phlyctenular keratitis and conjunctivitis. This is generally a benign lesion occurring at the limbus without effect upon vision and usually with a self-limited course. Local steroids are gen-

erally helpful. Occasionally the lesion may be intractable and may extend to produce significant corneal involvement. Here the use of grenz ray therapy is indicated. Five hundred roentgens* given weekly for three doses at 15 kilovolts is used to hasten the resolution of the lesion.[2,26]

2. Recurrent pterygium. We have not used radiation for the initial treatment of pterygium but if one or more recurrences develop to indicate an aggressive vascular component, radiation is used. Radiotherapy is begun immediately after surgical re-excision, within two to four days after the operation. Six treatments of 500 r at 25 kilovolts are given in two weeks. The results are similar to those described for beta radiation.[6,26]

3. Vascularization of the cornea. The cornea may become vascularized after specific injuries such as lime or thermal burns or following a variety of inflammatory lesions or surgical procedures (keratoplasty) in previously damaged corneas. Some of these lend themselves to experimental study. A series of experiments by Michaelson and Schreiber[27] showed that following thermal burns of the cornea of rabbits, x-ray therapy in the dosage given failed to prevent the development of new vessels entirely but did reduce the new growth by 75 per cent. Daily smaller doses were more effective than larger less frequent doses. Radiation after vessels were well established has little effect on the result.

This reflects our clinical experience that in long standing keratitis with vascularization, the vessels are affected very little by x-ray therapy. Following transplantation, neovascularization can be inhibited by radiation given as soon as it is mechanically safe to engage in the required manipulations. Five hundred roentgens given six times in two weeks at 15 to 20 kilovolts, using cones as small as are required to pinpoint the affected area, may be used.[21,23,26]

4. Ulcers of the cornea. In some instances even when local medication has failed, radiation may result in a quieting of an ulcerative lesion with a marked improvement in the patient's comfort. In the literature, beneficial effects have been described following its use on Mooren's ulcer, marginal ulcer, recurrent erosion, and other indolent and refractory ulcers.[2,11,19,20,26,31,35,41,46] Patients with bullous keratitis (due to endothelial dystrophy or aphakia with hyaloid adhesions of the cornea) can be palliated with radiation. Doses are of the order of 500 r twice weekly for two weeks at 15 kilovolts.

5. Carcinoma of the limbus. This tumor is usually squamous in nature and can often be treated surgically. If not completely excised or if recurrent, radiation therapy is indicated. The doses are of the order of 500 r given three times a week for a total of 4000 r at 30 kilovolts.[3,6]

6. Leproma. The common lesion of ocular leprosy is the conjunctival leproma spreading to involve the cornea.[40] In such patients the nodules shrink and disappear after treatment with grenz rays. In a follow-up extending to four years, no damage to cornea, lens or deeper structures was noted.

7. Precancerous melanosis of the conjunctiva. This pigmented lesion of the conjunctiva, although it has periods of spontaneous regression and exacerbation, generally proves to be radiosensitive in the precancerous phase. Following radiation the pigmentation in the treated area disappears. Five hundred roentgens are given six times in two weeks at 15 kilovolts.[36]

*Unless otherwise stated, dosage given refers to "dose in air."

8. Nodular episcleritis. This disease also has spontaneous remissions and frequently responds to local steroid therapy. In recalcitrant discomforting lesions, radiation is useful. Five hundred roentgens given six times in three weeks at 15 kilovolts usually produce resolution or, at least, palliation.[4,6,41]

Although at one time or another radiation has been used in amost every superficial ocular lesion for which other specific therapy is not available, the above list included only those in which radiation has its greatest success.

B. Deep Anterior Segment Lesions

Following the discussion on lesions of the outer envelope of the eye for which grenz ray therapy is suitable, the next group of diseases to be considered are those which are contained within the corneosclera and involve the anterior segments. This includes lesions of the anterior chamber and iris. However, the lens is relatively radiosensitive, and since safe radiation of surrounding areas depends upon differential radioresistance or favorable distance relationships to the source of the beam, it is impossible to radiate close to the lens effectively without producing radiation cataracts. Therefore the anterior chamber and iris can be treated only in patients (1) with aphakia, (2) with cataracts, or (3) in whom a possible cataract is a relatively acceptable complication.

1. Epithelization of the anterior chamber. This occurs either as a cyst (spontaneous or implantation) or as a membrane lining the anterior chamber. Squamous epithelium is relatively radioresistant. Therefore localized cysts are best treated with diathermy. The membranous epithelial lining which occurs following cataract extraction is often simulated by other membranes and treatment cannot thoughtfully be undertaken without surgical confirmation of the diagnosis by the taking of a biopsy, usually of iris. A surgical treatment of this membrane covering the cornea has been described.[34] If there is extensive iris and angle involvement, a considerable amount of epithelium may remain in the eye. Under these conditions x-ray therapy is indicated. The extent of the epithelial invasion of the anterior chamber varies widely; failures following radiation are common. However, several documented cases treated by iridectomy and positive biopsy have been arrested following radiation.[6,14,26,41] The factors are as follows: 60 kilovolts, 500 r given eight times in two to three weeks.

2. Iris tumors. A clinically diagnosed malignant melanoma of the iris was apparently arrested when treated by gamma rays in an extremely interesting manner, by the use of hollow needles containing radioactive tantalum wire. A cataract existed previous to the radiation and was later extracted. The melanoma became quiescent but did not disappear. No pathologic evidence of the nature of the tumor was presented.[22] The wires were passed through the corneosclera, one anterior to the iris and one behind it, and these were passed through the lids for immobilization. Melanomas are notoriously radioresistant, and those of the iris can often be approached surgically. If circumstances preclude local surgical intervention or enucleation, more conventional methods of radiotherapy could be used with greater safety to the eye, although radiation is not generally useful in the treatment of iris melanomas.

3. Nevoxanthoendothelioma of the iris. This is a congenital lesion which is becoming recognized with increasing frequency as a cause in infancy of recurrent anterior chamber hemorrhage complicated by glaucoma. Recently in such a patient, in addition to a gonio-

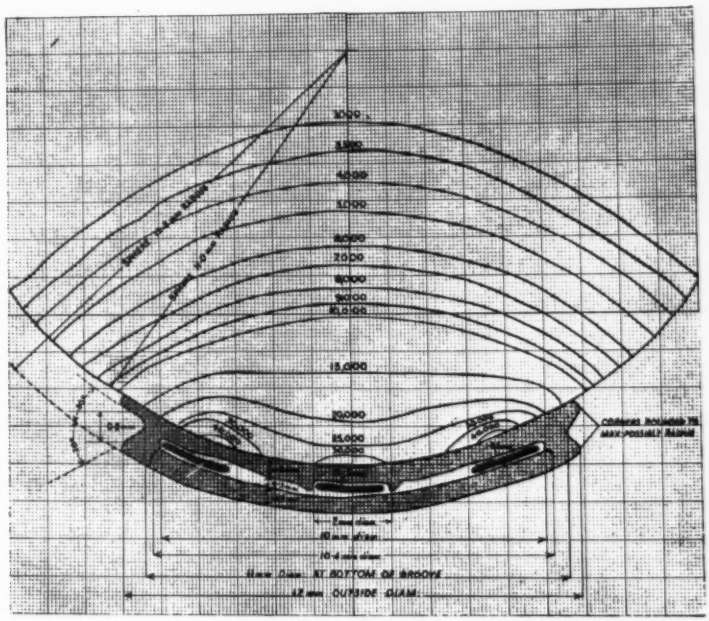


FIG. 6—Distribution of energy in the eye using a 10 mm. radium disc. (From Stallard, H. B.: Radiotherapy of Malignant Intraocular Neoplasms, Brit. J. Ophth., 32:618-639, with permission of the publishers.)

puncture, a small dose of x-ray was given; the mass became smaller, and the glaucoma has remained under control.[24]

C. Deep Intraocular Lesions

1. Retinoblastoma

The greatest service which radiotherapy offers ophthalmology lies in the treatment of retinoblastoma. In unilateral disease, at this time only rarely is any treatment other than enucleation indicated. Further work may change this concept. However, about 25 per cent of patients have bilateral disease. After enucleation of the eye with the more advanced disease in these cases, radiation may be given to the second eye. This treatment has been by gamma rays of radium and Co^{60} and radon seeds and radioactive tantalum (Ta^{182}) and roentgen rays ranging from low[5] to orthovoltage to supervoltage of the betatron.

a. The several methods of gamma ray radiation have been mentioned above. The chart (fig. 6) shows the distribution of radiation within the eye when exposed to a radioactive disc of appropriate concentration during a period of a week. It is seen that the area immediately beneath the disc receives extremely high concentrations. A tumor dose of 3500 r is achieved over a significant area. Stallard reports excellent results following the use of radioactive discs and recommends their use where less than one third of the retina is involved.

b. Because local gamma ray therapy has its greatest usefulness in the treatment of small retinoblastomas and be-

cause so many of these lesions are multiple, it is desirable to have a method of radiation which will produce within the ocular tissues a more uniform distribution of energy. Not only may the tumor be multiple at the time of initial examination but as time progresses further lesions may become clinically apparent; it is conceivable that the earliest beginnings of these were present but not yet visible at the time of the examination. Although secondary foci may develop in patients even while under x-ray treatment or after treatment has been completed, it is desirable to minimize this by distributing the x-radiation uniformly throughout the eye. The diagram (fig. 7) shows the relatively uniform distribution of ionizing energy throughout the eye when treated in the usual manner.

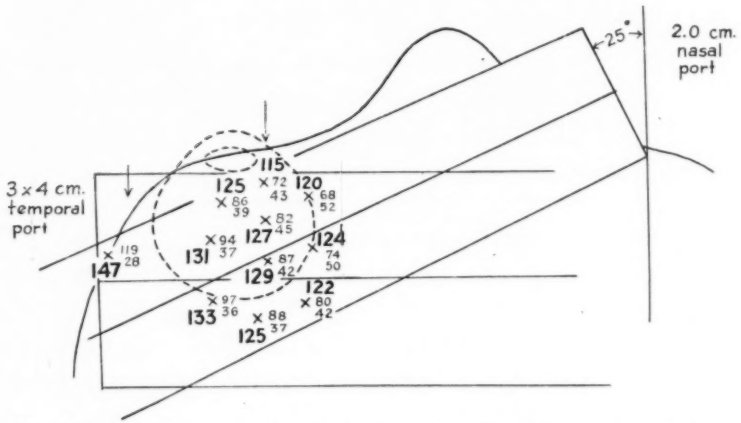


FIG. 7.—Distribution of energy in the eye using two portals (x-ray). Expressed in r per 100 r at the surface, the upper figure is the energy derived from the temporal portal and the lower from the nasal portal. The larger figure is the sum of the two. (Modified from Tapley[42a])

Since 1936 a group working with Dr. Algernon B. Reese has been treating retinoblastoma by radiation according to a technique which employs cones applied to a temporal and a contralateral nasal port in an effort to deliver an adequate dose to the posterior segment of the eye to the exclusion of the more vulnerable anterior sector. This treatment is used for patients with bilateral tumors whose eye with the more advanced lesion has been enucleated. The less involved eye has been treated when it was thought that useful vision might be salvaged if the tumor were arrested. Recently more and more cases, previously unfavorable, are being accepted for treatment. Until 1952 this group had treated 195 patients with an over-all cure rate with vision of 36 per cent. In more recent years the cure rate has been raised to 50 per cent. The earliest patients were treated with what would now be thought of as relatively high doses, up to 12,000 r to each of two small ports, with tumor doses as high as 18,000 r. With radiation dosage of this magnitude, complications, including neovascularization and retinopathy with intraocular hemorrhage and glaucoma, were common enough to limit the saving of useful vision. There-

fore an attempt has been made to reduce radiation dosage, and more recently an adjuvant in the form of a radiomimetic drug, namely triethylene melamine or TEM, has been used. The details of the progress in this therapy have been reported.[37]

Although the use of anesthesia or a plaster case has been described,[9] the firm hands of a compassionate parent have generally been adequate. Recently a fixation device comprised of a thin-walled rubber bag filled with fine plastic granules which becomes firm upon evacuation has been useful in fixing the position of the child's head. At the present time 220 kilovolts, 20 milliamperes, a target skin distance of 50 cm. with a 0.5 mm. of copper and 1.0 mm. of aluminum filter have been employed. The tumor dose is 3500 r delivered over a 3-week period. A 2 cm. cone is directed from the opposite side of the node, and a 3x4 cm. port is used temporally.

The oral administration of TEM led to vomiting and irregularity of absorption which made it difficult to assay properly the dose of the drug given. This was evident by the frequent failure of hematopoietic depression, which is the most valuable index of adequate TEM dosage. More recently with the use of an intramuscular preparation there have been reproducible therapeutic results. This method has proved generally satisfactory, but in each of the following unusual situations the TEM is administered by the internal carotid artery:

1. Cases with large multiple lesions with still enough normal appearing retina left *in situ* so that if tumor arrest could be accomplished, there would be some useful vision

2. Cases with tumor seeds in the vitreous

3. Cases with intraocular lesions unsuccessfully treated by other methods: diathermy, x-ray alone, x-ray with oral or intramuscular TEM

4. Cases of residual tumor in the optic nerve discovered after enucleation

5. Cases of residual tumor discovered in the orbital tissue either in the intervaginal space or around the optic nerve, having reached these sites because of choroidal invasion, which is usually present only in the advanced lesions

6. Cases of recurrent orbital growth after enucleation

7. Cases that have been treated elsewhere by various combinations of treatment including different means of employing x-ray or radon, and in some instances diathermy, but with recurrent growth present.

In the most recent report on the treatment of these children,[37] Reese noted 90 per cent arrest in the series of patients given intramuscular TEM and radiation with 3500 r tumor doses. Although these figures are applied to a group which is currently under observation and as yet early in the follow-up, when a similar report on the use of the oral TEM was made four years ago, there was only a 70 per cent cure. In the advanced lesions which ordinarily would call for enucleation of the eye, the use of intra-arterial TEM and radiation has arrested growth in 60 per cent.

Radiation alone may cure retinoblastoma but TEM is not known to do so. The two seem to be synergistic or supplementary. That the addition of TEM is effective is suggested by the fact that in a series of 12 cases with alternate treatment between x-ray and x-ray plus TEM, three of the six eyes treated by x-ray alone showed active growth while all of those treated by x-ray plus TEM were arrested.

Approximately 250 patients with retinoblastoma have been included in

these studies up to this time because of an extraordinary problem. Although most of these were segregated because of the presence of bilateral disease, there were, in addition, 23 patients whose eyes at the time of enucleation showed extraocular tumor at pathologic examination. The tumor may have reached this position either through emissaria after invasion of the choroid or through the optic nerve. Even a proximal section of optic nerve free of tumor does not mean that the tumor may not have reached the cranium if it is in the optic nerve outside the eye, since retinoblastoma notoriously skips over normal areas through the vaginal space.

The pathologic reports include "a few cells outside the globe," "tumor in the optic nerve," "emissaria full of tumor," etc. Of the 25 patients with residual tumor, 7 are alive for periods from four to twenty years respectively, and 2 are alive—one for eleven, and one for seventeen months. One is alive although metastasis has occurred, and one has not recently been examined but there was gross tumor in the orbit and the situation seemed hopeless. On one other, no follow-up information is available. Sixteen others have died. All of the patients who are alive have received radiation, some by x-rays, some with radon seeds and some with both. Four of the 25 patients were treated by exenteration but of these four, only one is now alive.

Although all these 25 patients are grouped as patients with residual disease in the orbit, it is obvious that patients with merely a few cells outside the eye may be included as well as patients who already have metastatic disease, so on the pathologic diagnosis alone it is almost impossible to predict what the behavior will be. Certainly none in the latter category would be saved by therapy now available.

Nine of the 25 patients have received TEM therapy. Of the 7 long-term survivors only 1 has received TEM, and both patients who have survived up to this date, less than a year and a half, have received TEM. This is related to the fact that the long-term survivors had been treated before the advent of TEM and there is, therefore, in this study no evidence that TEM therapy is useful in the treatment of residual disease. However, it is clear that in any patient in whom the diagnosis of residual retinoblastoma is made, radiotherapy should be given to the orbit and exenteration is not of proved value.

2. Von Hippel's disease

In the case of early well localized Von Hippel's disease of the retina, the treatment of choice is diathermy, but in more extensive disease x-radiation may be used. A case has been reported in which an eye with advanced disease did not respond to radiation, but in the fellow eye the tumor regressed following one course of 1800 r, and a second of 200 r two and one half years later.[7] Eight years later the site of the original tumor was unchanged but a new lesion had developed. A case has been reported in which, following three courses of radiotherapy to an eye after an interval of three years, large vessels were present but the angioma itself was scarred.[8]

3. Coats' disease

Lesions which have been clinically described as Coats' disease have been treated by radiation. Using contact therapy (60 kilovolts) 3600 r has been administered to an eye.[33] Visual acuity improved from 1/10 to 7/10 and the area was replaced by atrophic chorioditis.

4. Metastatic tumor of choroid

The most common metastatic tumor of the choroid is the carcinoma arising in the female breast. Even in patients with diffuse disease, hormonal therapy

by external administration or hormonal alterations by surgical procedures (adrenal or pituitary) are prolonging the lives of patients and palliating pain. Ocular metastases are occasionally bilateral and, since they generally produce visual defects, are especially distressing to these unfortunate patients. Radiotherapy (tumor doses of 2500 r administered in the orthovoltage range through a temporal port) has resulted in regression of the tumor and improvement of vision with retention of the globe. This is especially important to the patient and is invaluable in supporting his morale.[26,38,40,47]

5. Neovascularization of the retina and vitreous hemorrhage

Retinal hemorrhage, whether part of the picture of Eales' disease or of diabetic retinopathy, has been treated in the past by radiation.[15,17,45] Initially there appeared to be optimism, but the results have not been sustained and radiation is no longer considered a treatment of choice in these diseases.

6. Uveitis

In active uveitis extremely small doses of radiation have been used to supplement conventional therapy with reportedly good results.[1,6,13,31,38] The doses used are extremely small, of the order of 50 to 85 r every five days for several doses.

A variety of other diseases have also been treated with radiation but the results are not well enough documented to permit judgment.

7. Retinal vein thrombosis[6]

8. Sympathetic ophthalmia[43]

9. Hemorrhagic glaucoma[18]

10. Absolute glaucoma[10]

REFERENCES

1. Alvaro, Moacyr E.: The part played by roentgen rays in the treatment of uveitis, Ophthalmologica, 118:469-482 (Oct.-Nov.) 1949.

2. Angius, T., and Mojne, G.: La plesioterapia in oculistica [Plesio-roentgentherapy in ophthalmology], Rass. ital. ottal., 16: 107-130 (March-April) 1947.

3. Bétoulières, P.; Boudet, Ch., and Battesti, N.: La radiotherapie de contact dans lé traitement des épithéliomas du limbe scléro-cornéen [Contact radiotherapy in treatment of epitheliomas of the sclerocorneal limbus], J. de radiol. et d'électrol., 31:92-95, 1950.

4. Blegvad, O.: On x-ray treatment of scleritis, Acta Ophth., 25:397-404, 1947.

5. Cleasby, Gilbert W.: Long-term cure of retinoblastoma with x-rays, Am. J. Ophth., 44:411-412 (Sept.) 1957.

6. Contardo, R.: X-ray treatment in ophthalmology. IV Congress, Pan-American Ophthalmological Association, 2:735-840, 1952.

7. Cordes, Frederick C., and Schwartz, Ariah: Angiomatosis retinae (von Hippel's disease) eleven years after irradiation, Tr. Am. Ophth. Soc., 50:227-239, 1953.

8. Craig, W. M.; Wagener, H. P., and Kernohan, J. W.: Lindau-von Hippel disease, Tr. Am. Neurol. A., 65:98-101, 1939.

9. Csapody, István, and Kovács, Akos: Röntgenbehandlung von Gliomaugen [X-ray treatment of gliomatous eyes], Klin. Monatsbl. f. Augenh., 122:43-51, 1953.

10. Di Luca, G.: Observazioné sull'oftalmite simpatica dal puto di vista clinico e terapeutico, con particolare riferimento alla röntgenterapia [Observations in sympathetic ophthalmitis from a clinical and therapeutic point of view, with special reference to x-ray therapy], Boll. d'ocul., 30:354-384 (June) 1951.

11. Franceschetti, A.; Sarasin, R., and Balavoine, C.: A few indications for roentgen therapy in ophthalmology, Am. J. Roentgenol., 68:38-46 (July) 1952.

12. Fricke, Robert E.; Van Herik, Martin, and Henderson, John W.: Radium and surgical treatment of retinoblastoma, Surg. Clin. North America, 31:1147-1155 (Aug.) 1951.

13. Fried, Carl: Roentgen e radiumterapia na oftalmologia [Roentgen and radium therapy in ophthalmology], Ophth. ibero am., 9:323-344; English trans., 345-366, 1948.

14. Gallardo, Edward, and Weidenheim, C. W.: Epithelial membrane in anterior chamber after cataract surgery, Am. J. Ophth., 39:868-870 (June) 1955.

15. Guyton, Jack S., and Reese, Algernon B.: The use of x-ray therapy for retinal diseases characterized by new-formed blood vessels, Tr. Am. Acad. Ophth., 52: 525-546 (May-June) 1947.

16. Henderson, John W.: Intracavitary optic radon applicator, Tr. Am. Acad. Ophth., 57:614-615 (July-Aug.) 1953.

17. Hoffman, W.: Über die Behandlung von Glaskörperblutungen mit Röntgenund Radiumstrahlen [The treatment of vitreous hemorrhages with x-rays and radium], Klin. Monatsbl. f. Augenh., 126:575-580 (May) 1955.

18. Hufford, C. E.; Curtzwiler, F. C., and Roberts, J. L.: Roentgen therapy in vitreous hemorrhage and hemorrhagic glaucoma, Radiology, 59:161-166 (Aug.) 1952.

19. Jones, Jack W., and Alden, Herbert S.: Roentgen ray treatment of the eye, Arch. Dermat. & Syph., 43:92-98 (Jan.) 1941.

20. Lederman, M.: Radiotherapy of diseases of the cornea, J. Fac. Radiologists, Lond., 4:97-114 (Oct.) 1952.

21. Lenz, Maurice: Radiotherapy for the prevention and obliteration of corneal vascularization, Am. J. Ophth., 33:46-52 (March, Pt. II) 1950.

22. Lloyd, J. P. F., and Ellis, Frank: Melanoma of iris treated by radiation therapy, Brit. J. Ophth., 39:507-509 (Aug.) 1955.

23. Magni, S., and Zaffagnini, E.: Sul trattamento plesioroentgenterapico della vascolarizzazione della cornea in rapporto al trapianto corneale [Plesio-roentgentherapy of corneal vascularization in relation to keratoplasty], Rass. ital. ottal., 22:269-285 (May-June) 1953.

24. Maumenee, A. E., and Longfellow, D.: To be published.

25. Merriam, George R., Jr.: A clinical study of radiation cataracts, Tr. Am. Ophth. Soc., 54:611-653, 1956.

26. ———: Ocular radiation therapy. In Yale University Clinical Conference, January 13, 1956, Am. J. Ophth., 43:300-302 (Feb.) 1957.

27. Michaelson, I. C., and Schreiber, H.: Influence of low-voltage x-radiation on regression of established corneal vessels, A.M.A. Arch. Ophth., 55:48-51 (Jan.) 1956.

28. Moore, R. Foster: The value and technique of the use of radon in certain intraocular conditions, Tr. Ophth. Soc. U. Kingdom, 53:215-223, 1933.

29. ———:Presidential address, Tr. Ophth. Soc. U. Kingdom, 55:3-26, 1935.

30. Moore, R. Foster; Stallard, H. B., and Milner, J. G.: Retinal gliomata treated by radon seeds, Brit. J. Ophth., 15:673-696 (Dec.) 1931.

31. Morano, M. S., and Franchi, B.: Plesioroentgenterapia di alcune affeezioni oculari [Plesio-roentgentherapy in some ocular diseases], Boll. d'ocul., 27:625-638 (Oct.) 1948.

32. Newell, Frank W., and Harper, Paul V.: Local irradiation of metastatic carcinoma of choroid with radioactive iodine; a preliminary report, Am. J. Ophth., 44:222-224 (Aug.) 1957.

33. Paufique, L., and Etienne, R.: Traitement radiothérapique de la rétinite de Coats [Radiotherapy in Coats's retinitis], Bull. Soc. opht. France, 3:342-343 (March) 1953.

34. Pincus, Morris H.: Epithelial invasion of anterior chamber following cataract extraction. Effect of radiation therapy, Arch. Ophth., 43:509-519 (March) 1950.

35. Pitter, J., and Rubes, R.: Therapy by radiant energy in ophthalmology, Casop. lék. cesk., 94:877-882 (July) 1955.

36. Reese, Algernon B.: Tumors of the Eye, New York, Hoeber, 1951.

37. Reese, Algernon B.; Hyman, George A.; Tapley, Norah duV., and Forrest, Arnold W.: The treatment of retinoblastoma by x-ray and triethylene melamine, A.M.A. Arch. Ophth., 60:897-906 (Nov.) 1958.

38. Rosselet, Ed., and Rosselet, P. J.: Métastases intra-oculaires et radiothérapie [Intraocular metastases and radiotherapy], Radiol. Clin., 25:355-358 (Nov.) 1956.

39. Sagher, F., and Miterstein, B.: Effect of grenz rays on leprous infiltrations. III. Response of lesions of the anterior portions of the eyeball, Arch. Ophth., 38: 78-88 (July) 1947.

40. Sedan, J.: Avérison totale apparente d'une tumeur métastatique de la choroide traitée par radiothérapie ponétrante [Apparent complete cure of a metastatic growth in the choroid by radiotherapy], Bull. Soc. opht. France, 4:161-165 (April) 1950.

41. Sherman, Robert S., Jr., and Hogan, Michael J.: Radiation therapy in diseases of the eye, California Med., 80:83-90 (Feb.) 1954.

42. Stallard, Hylas B.: The use of radium discs in the treatment of malignant intraocular neoplasms, Tr. Ophth. Soc. U. Kingdom, 72:417-418, 1952.

43. Strazzi, A.: Roentgentherapy of painful absolute glaucoma, Gior. ital. oftal., 4: 444-453 (Nov.-Dec.) 1951.

43a. Tapley, N.: Personal Communication.

44. Trott, N. G., and Wheatley, B. M.: Tantalum 182 wire gamma-ray applicators for use in ophthalmology, Brit. J. Radiol., 29:13-14 (Jan.) 1956.

45. Trueman, Robert H.; Beardwood, Joseph T., and Smith, Julius J.: X-ray therapy in retinopathy, Diabetes, 2:13-22 (Jan.-Feb.) 1953.

46. Vannini, A., and Pettinati, S.: La plesioterapia nelle affezioni erpetiche della cornea [Plesiotherapy in herpetic corneal afflictions], Rass. ital. ottal., 24:391-399 (Sept.-Oct.) 1955.

47. Voisin, J.; Mallet, L.; Boudon, C., and LeCamus: Carcinome métastatique de la choroide traité par la radiothérapie [Metastatic carcinoma of the choroid treated by radiotherapy], Bull. Soc. opht. France, 4:165-168 (April) 1950.

48. Waldman, J.: New method of applying radon seeds for ocular disorders, Arch. Ophth., 23:55-59 (Jan.) 1940.

OCULAR THERAPY WITH BETA PARTICLES

JAMES E. McDONALD, M.D.
CHICAGO, ILLINOIS

FRED M. WILSON, M.D.
INDIANAPOLIS, INDIANA

BETA radiation has been used in ophthalmology for about forty years. Because of the lack of any therapeutic equivalent, its faults have been tolerated; but the search for a better applicator has continued through several radioactive materials and a variety of instruments of different design. All the while its pendulum of popularity has swung back and forth with considerable amplitude. As a result, few types of therapy in ophthalmology have enjoyed more undeserved praise or have received more unjust condemnation than beta radiation. Most likely its true value would seem to lie somewhere between these two extremes.

It is the purpose of this paper to evaluate the results in 694 eyes treated with beta radiation and to attempt to establish new, or confirm old, indications and contraindications for beta radiation in the treatment of certain ocular conditions.

BETA RADIATION DOSIMETRY

Problems of beta radiation dosimetry have been discussed in earlier papers in this symposium.

For clinical comparisons of the rep (roentgen equivalent physical) unit of strontium and the gram-second unit of radon, one may use, as a very rough approximation of equal clinical effectiveness, 1 gram second of beta-radon equals 2,000 rep.

Because of the sensitivity of beta radiation applicators to small differences in design, and because of technical difficulties in measuring the surface output of these applicators, some inconsistencies of calibration and problems of clinical dosage have resulted. For example, previous studies by Wilson[13] showed that a 1953 rep was as much as one third more potent than a 1950 rep, as tested on the rabbit cornea.

Since it appears unwise at this time to rely entirely on physical calibration to indicate clinical dosages, every new applicator should not only be standardized by physical methods, but also should have its radiobiologic effectiveness checked experimentally before making clinical applications to the human eye. This applies equally to applicators having similar loads and designs and coming from the same manufacturer, since, as previously implied, and as Kastner and Greenberg[5] pointed out, two beta applicators may be of identical size, of the same type, and have the same amount of radioactive material, but yet may differ in surface dose rate, depth dose, or total energy output.

From the Departments of Ophthalmology of the University of Illinois College of Medicine, Chicago, and Indiana University Medical Center, Indianapolis.

Presented at the Sixty-Third Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 12-17, 1958, Chicago.

TABLE I

SOURCES OF BETA RADIATION

SOURCE OF BETA RADIATION	STRENGTH OF APPLICATORS	DEPTH DOSE (% OF SURFACE)					GAMMA RAYS %
		1 MM.	2 MM.	3 MM.	4 MM.	5 MM.	
Radium	(Iliff) 50 mg.	17	8	4	2	1	>3.5
Radon	(Burnam) 50-400 mc.	20-50	6-25	3-10	2-5	1-3	3.5
Radium D-E	10-20 mg.	10	1	—	—	—	0
Sr 90-Y 90	50-125 rep sec.	41-55	19-33	7-18	4-8	1-4	0

The technique of biologic calibration, based on the determination of the minimum inflammatory dose on the rabbit cornea (a value which has averaged 22,500 rep ± 11 per cent in recent years), has been described elsewhere.[14]

DEPTH DOSE

This is an expression of the fall-off of surface dose at succeeding levels of penetration. It is necessary to consider it separately, since surface output reflects only the quantity of emitted electrons; it tells nothing about their energy, and so indicates nothing of their penetrating power. Depth-dose data, however, indicate penetrating power and, therefore, reflect the possible clinical effectiveness and dangers of any particular beta source.

Ideally, the selection of beta sources should be made with regard to the depth of the lesions to be treated. For example, recurrent pterygium treated postoperatively requires only surface irradiation; whereas more penetrating irradiation is necessary for tumors or deep corneal vascularization. Radium-D could be used for superficial lesions; radioactive strontium (Sr^{90}) for the deeper ones.

Depth-dose information is also important in relation to the possible formation of cataracts. When contact therapy is applied to the limbus, particularly, the sensitive equatorial cells of the lens are only 3 mm. away and, for the various source materials, receive the indicated percentages of surface dose (table I). Krohmer[7] provided the physical basis for comparing the depth doses of various beta applicators having different radioactive source materials.

BETA RADIATION SOURCES AND APPLICATORS

Four major sources of beta radiation have been used in ophthalmology (table I). Today, however, beta radiation therapy of the eye is commonly accomplished with the gamma-free strontium applicator (fig. 1, A).

Radium and radon applicators, unlike radium D-E and strontium-90 applicators, emit gamma in addition to beta radiation. Because of the relatively small amount of gamma radiation from radon, a therapeutic dose of beta can be applied superficially to the eye without undue gamma absorption in the deeper structures. The percentage of gamma is

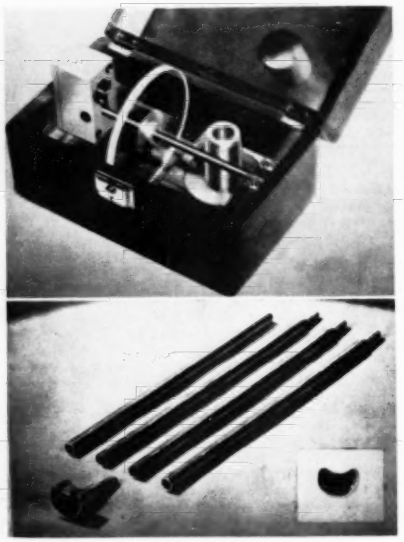


FIG. 1—(Top) Strontium-90 beta applicator; (bottom) Hughes radon applicator.

somewhat greater in radium than in radon applicators because of the absorption of beta particles by the radium mass itself. With all applicators emitting gamma radiation, precautions must be taken to prevent excessive exposure of the therapist, and special storage facilities must be provided to shield all nearby personnel and photosensitive supplies.

Many of the patients whose cases are reported here were treated with strontium-90 applicators (fig. 1, A). One type used extensively had an approximate output of 93 rep per second and a special 5 mm. (diameter) active surface; many patients were also treated with the usual commercial applicators having 7.8 mm. active faces and outputs varying from 25 to 125 rep per second.

Prior to 1952 the Hughes radon applicator[4] (fig. 1, B) was used. In this applicator, glass needles containing radon were placed in or near contact with the tissue.

INDICATIONS FOR BETA RADIATION

Generally, the indications for beta radiation are much the same as those for other types of radiation. Irradiation is always destructive, and before it can be used successfully, there must be a greater sensitivity in the pathologic cells to be destroyed than in the adjacent cells to be spared—a situation frequently difficult to evaluate.

Because of late complications and uncertainties in dosage, the specific indications for beta radiation therapy have narrowed considerably during the last few years. Decisions to use it have been made largely on an empirical basis, because of our ignorance of many pertinent details. Matters of applicator output, dosage, mode of action, relative tissue tolerances, recovery factors, cumulative and late effects have been, and still are to a great extent, problems without specific answers.

As a therapeutic agent, beta radiation can no more be all bad because of its side effects and late complications than it can be all good because of its effectiveness in certain conditions. As more experimental and clinical information becomes available, it should be possible to establish more exactly those critical dosages which lie between, or fail to lie between, effectiveness and complications.

In an effort to contribute something to our understanding of the indications, dosages, results, and complications of beta radiation in ophthalmology, a follow-up study was made of patients treated at the University of Ilinois and the University of Indiana.

CASE MATERIAL

There were 741 beta-treated eyes in all; follow-up information on these was obtained either by examinations made

expressly for the purpose (463 eyes) or from post-treatment entries in their medical records (278 eyes). Forty-seven eyes had to be eliminated from the study, because they had received other types of radiation in addition to beta and the results could not be evaluated properly. The remaining mass of material representing 694 beta-treated eyes was placed on IBM punch cards and analyzed. The results of this analysis constitute the basis of the discussion which follows.

About 60 per cent of the cases were treated with radon, the remaining 40 per cent with radioactive strontium (Sr^{90}). Clinical and experimental studies confirm the essential similarity in the therapeutic results and frequency of complications from the two sources. The early use of the Hughes applicator resulted in a much longer follow-up of those eyes treated with radon. Many of the radon treated patients studied here were reported by Hughes[3] in 1952. Data regarding the length of follow-up from the time of radiation to the last visit are given in table II.

CLINICAL RESULTS

The results of beta therapy are difficult to quantitate. Nevertheless, efforts were made to place the subjective and objective results into grades of excellent, good, fair, temporary improvement only, no change, or worse.

There was usually good agreement between the final objective appearance of a treated eye and the subjective evaluation of the therapy as determined by asking the patient, "Do you feel that the treatment helped your eye?" Even the objective results must be viewed with some reservations in many of these cases in which the history of the disease is one of remissions and exacerbations.

Corneal Vascularization

The radiosensitivity of blood vessels makes corneal vascularization amenable to treatment with beta radiation. In general, superficial blood vessels have been more responsive to treatment, probably because they absorb a greater amount of radiation. New, actively growing capillaries are particularly sensitive to beta

TABLE II

LENGTH OF FOLLOW-UP OF PATIENTS TREATED WITH BETA RADIATION

FOLLOW-UP IN YEARS	NO. OF CASES	PERCENTAGE
<1 yr.	219	40
1-2 yrs.	81	13
2-4 yrs.	97	14
4-7 yrs.	117	16
>7 yrs.	119	17
Totals	693	100

radiation. On the other hand, large, well established vessels require so much radiation, especially if they are deep, that the results or side effects are often disappointing.

The response to beta radiation depended not only on the vascularization itself, but also on the conditions associated with it (table III).

The most gratifying results, both subjectively and objectively, were obtained in rosacea keratitis. Some of these cases had failed previously to respond to other measures, including local steroid therapy. Of the 42 cases of rosacea keratitis, 85 per cent had definite improvement; 5 per cent showed only temporary improvement; 5 per cent were not improved, but none became worse after treatment. Vision improved, by one or more Snellen lines, in 46 per cent of the cases.

It appeared from the data that the dose necessary to eliminate the vessels of rosacea keratitis in a given area approached the minimal cataractogenic dose. However, relief of irritability in

TABLE III

RESULTS OF BETA RADIATION VS. CORNEAL VASCULARIZATION

CONDITION	NO. OF CASES	AVERAGE TOTAL DOSE, GM. SECS.*	AVERAGE TOTAL DOSE, REP × 1000†	RESULTS IN PERCENTAGES G	F	TIO	NC	W
Rosacea Keratitis	42	12	6	86	5	5	5	0
Primary Vascularizing K.	14	15	15	29	36	7	28	0
Corneal Ulcer	27	12	11	42	33	0	17	8
Chemical Burn	35	11	5	26	58	0	10	6
After Corneal Transplant	5	12	12	40	60	0	0	0
Scar of Unknown Etiology	16	13	13	30	40	0	30	0
Trachoma	17	11	15	27	27	0	33	13
Interstitial Keratitis	6	7	6	0	0	0	100	0
Dystrophy	7	9	—	29	57	0	14	0
Keratoconus	7	6	10	29	29	0	43	0
Other	27	11	13	31	38	0	31	0
TOTALS	198			43	33	2	20	3

*Gm. Secs. = Gram Seconds (with the Hughes radon applicator).

†The Tracerlab Sr-90 ophthalmic applicator was usually used.

G = excellent to good.

F = fair.

TIO = temporary improvement only.

NC = no change.

W = worse.

vascularizing rosacea keratitis was frequently quite definite after beta therapy and did not appear to be dependent on the total elimination of vascularization. Symptomatic improvement is therefore a more conservative therapeutic goal than devascularization.

In other types of corneal vascularization results were excellent to good in roughly one third of the cases. The results in primary vascularizing keratitis, chemical burns, trachoma, and interstitial keratitis were disappointing. Failure to devascularize the cornea, continuation of the inflammatory process, aggravation of the subjective irritability were among the unsatisfactory results.

Even the benefits of eliminating corneal blood vessels in these and other conditions may be nullified by radiation side effects, which will be mentioned later.

Pterygium

This was a common indication for beta radiation; there were 236 cases in this series (table IV). Several years ago, 39 cases of pterygium were treated with beta radiation only; that is, without previous surgical intervention. Relatively high doses were required; in spite of this, 10 per cent developed recurrences. Also during this early period, other patients with recurrent pterygia were treated more than one month after a surgical operation. These cases were similar in many respects to those irradiated without previous surgical intervention, because the vessels had become well-established before treatment was given. Relatively large doses of radiation were necessary. The percentage of recurrences in this group was 13 per cent.

Results were best in cases irradiated within one month after surgical removal. For previously recurrent pterygia, the recurrence rate was 2 per cent; for first pterygia, zero. It is difficult to say what the recurrence rate would have been without beta irradiation, for many of these pterygium cases were referred, making an adequate control series impossible. Nevertheless, the results contrasted so favorably with pterygium recurrence rates cited by others (60 to 70 per cent,[1] 9 per cent[6]) that it was difficult to deny them significance. King,[6] speaking of zero recurrence rates in a review article on the subject, stated, "One may justifiably suspect that in a series in which no failures are reported the patients have not been carefully followed."

TABLE IV

EFFECT OF BETA RADIATION ON PTERYGIUM EITHER WITH OR WITHOUT SURGICAL OPERATION

TYPE OF THERAPY	NO. OF CASES	AVERAGE TOTAL DOSE		PERCENTAGE OF RECURRENCE
		GM. SECS.	REP × 1000	
Beta without surgery	39	13	13.4	10
Recurrence, Rx >1 month postoperative	61	11	7	13
Recurrence, Rx <1 month postoperative	42	7	6	2
Primary operation, Rx 1 month postoperative	81	—	3	0
Pseudopterygia	13	13	12	21

During the past few years, we have not used beta radiation as a primary treatment for pterygium because of the high dose required and high recurrence rate; instead, we have used it only as an adjunct to surgical removal, the radiation being applied in the immediate postoperative period, as suggested by others.[10] This has resulted in a reduction in the rate of recurrences as well as a lowering of the radiation dose. At the present time, the pterygium operation is followed by 1,000 to 2,000 rep within four to seven days, and this therapy is often repeated one to four weeks later. We recommend that beta radiation be reserved to the treatment of previously recurrent pterygia.

There were 13 eyes with variously caused pseudopterygium treated with beta radiation, usually combined with surgery. Three of these cases, or 21 per cent, developed recurrences.

Limbal Tumors

We are happy about our results in tumors of the limbus. All cases of limbal tumors included here responded well to beta radiation, either with or without partial excision (table V); one case of epithelioma regressed very slowly under treatment, although it ultimately appeared to be cured.

Several of the limbal tumors responded to doses as low as 5 gram seconds or 3,000 rep. It may be that excessive doses were used in treating some of the cases several years ago, and it is recommended that radiation treatment of such lesions be combined wtih biopsy whenever possible, and that the dosage preferably be limited to about 5,000 rep in one area for malignant and resistant tumors. This dose appears to be just insufficient to produce peripheral lens vacuoles and yet may be adequate to eliminate a superficial tumor. The accessibility of these lesions to slit lamp examination and their lack of a tendency to metastasis helps justify this conservative dosage of radiation.

Inflammatory Conditions of the Cornea

The treatment of inflammatory conditions of the cornea has been limited to cases which have responded poorly to other treatment. Doses have been relatively low, that is, from 500 to 1,000 rep every one to four weeks. Such radiation treatment presumably does not destroy offending organisms; possibly it stimulates the formation of immune bodies.

Because of the natural healing tendency of various forms of keratitis and

TABLE V

EFFECT OF BETA RADIATION ON LIMBAL TUMORS

CONDITION	NO. OF CASES	AVERAGE TOTAL DOSAGE		PERCENTAGE CURES
		GM. SEC.	REP × 1000	
Papilloma	3	10	3.5	100
Epithelial Plaque	3	6	11	100
Bowen's Disease	5	6	10	100
Epithelioma	11	8	14	100*

*One case responded very slowly, but with apparent cure.

TABLE VI

EFFECT OF BETA RADIATION ON CORNEAL ULCERS AND KERATITIS

CONDITION	NO. OF CASES	AVERAGE TOTAL DOSAGE		RESULTS*				
		GM. SEC.	REP × 1000	G	F	TIO	NC	W
Superficial Punctate K.	4	6	2.7	50	25	0	25	0
Acute Corneal Ulcer	4	3.5	3	100	0	0	0	0
Chronic Corneal Ulcer	11	9	5.5	73	0	9	9	9
Stromal Herpes Simplex K.	11	9	6	55	0	9	36	0
Other Keratitis	34	9	—	55	18	3	18	6

*For abbreviations, refer to table III.

corneal ulcer, it is difficult to evaluate the effects of beta radiation in such conditions. The results (table VI) and nontabulated observations in certain cases suggest that beta radiation in small doses may at times be helpful.

Five cases of *dendritic ulcer* treated with 500 rep weekly for three or four weeks responded slowly but favorably. This might represent the natural course of the disease, but in three cases there appeared to be a definite clinical response to the treatment after a period of failure with other therapy.

Vernal Conjunctivitis and Allergic (Phlyctenular) Keratitis

Vernal conjunctivitis and allergic conditions of the conjunctiva and cornea may be relieved by local steroids. However, certain cases of this type either fail to respond satisfactorily or have frequent recurrences. This is often true of palpebral vernal catarrh with large, pavement-stone vegetations and ropy discharge, and of allergic keratitis in the lower cornea associated with superficial vascularization. The results of beta radiation in these cases are given in table

TABLE VII

EFFECT OF BETA RADIATION ON VERNAL CONJUNCTIVITIS AND ALLERGIC (PHLYCTENULAR) KERATITIS

CONDITION	NO. OF CASES	AVERAGE TOTAL DOSAGE		RESULTS*				
		GM. SEC.	REP × 1000	G	F	TIO	NC	W
Palpebral Vernal Conjunctivitis	49	11	8	43	38	0	19	0
Limbal Vernal Conjunctivitis	14	8	8	92	0	8	0	0
Phlyctenular Keratitis	7	13	7	86	14	0	0	0

*For abbreviations, refer to table III.

TABLE VIII

EFFECT OF BETA RADIATION ON LID LESIONS

CONDITION	NO. OF CASES	AVERAGE TOTAL DOSAGE		RESULTS*				
		GM. SEC.	REP × 1000	G	F	TIO	NC	W
Trichiasis	42	4	5	71	17	5	7	0
Granulation Tissue	6	11	8	100	0	0	0	0
Papilloma or Hemangioma	22	9	6	86	10	0	5	0
Carcinoma	12	16	4	62	0	38	0	0

*For abbreviations, see table III.

VII. These cases should first be treated with local steroids; if this fails, conservative beta therapy can then be tried.

Total doses of 5,000 rep per area, occasionally more, may be required in vernal conjunctivitis of the upper lids, but care must be taken to avoid the lashes. This dose can be repeated after several weeks.

Dosage for limbal vernal conjunctivitis and phlyctenules, as for any lesion at the limbus, should be kept below the minimal cataractogenic dose. Doses as low as 1,000 to 2,000 rep divided or in single fractions, may be sufficient to alleviate symptoms and to eliminate some of the allergic type of tissue and superficial vascularization. When the response is inadequate, this dosage may have to be repeated after an interval of several weeks.

Episcleritis and Scleritis

Five cases of episcleritis and scleritis were treated. Three of the cases seemed to respond well; one had only temporary improvement; and one became worse after treatment. Whether these were therapeutic responses cannot be told with certainty because of the naturally variable course of cases of this sort. For the present, therefore, beta treatment should be used only on a symptomatic basis until its true value, if any, is established in this condition.

Lid Lesions and Trichiasis

Any evaluation of results of radiation in lid lesions (table VIII) should include the problem of epilation. Insufficient time has elapsed to determine whether the epilation will be permanent following certain dosages of radiation.

In all cases in which epilation followed beta radiation there was a latent period of approximately five weeks. During this time the lid margin was crusted and mildly irritable. The lashes then fell out. In some cases, although the treatment was successful from the objective standpoint, beta epilation left the patient with a vague scratchy sensation which persisted sometimes for years. The cilia adjacent to the epilated area seemed thinned and depigmented. It was a clinical impression that these adjacent thin hairs had more than a normal tendency to be misdirected toward the cornea.

The present impression is that 3,000 rep will usually produce epilation which may be permanent, although in one patient the lashes grew again after 6,000 rep. We cannot recommend beta radiation for intentional epilation because of the associated irritability and because

our results are without long term follow-up.

In general, granulation tissue is considered quite sensitive to radiation. The results in this small series confirmed this belief. Both papillomas and hemangiomas of the lid margins and conjunctiva are sensitive to beta radiation. These lesions are usually well treated by excision, and beta can be used in case of recurrence.

Because of the lack of penetration of beta radiation, most malignant lesions of the lid margin should not be treated with this form of therapy. This applies particularly to carcinomas, since the results in our 12 beta-treated cases showed five recurrences.

Conditions in Which Beta Radiation Is Contraindicated

Beta radiation is contraindicated for several ocular conditions because (1) it is not effective, (2) better treatment is available, or (3) undesirable complications follow its use. These conditions include malignant tumors of the lid margin, nevus, dermoid, pinguecula, pterygium without preradiation surgery, pemphigus, corneal scars without vascularization, Fuchs' endothelial-epithelial dystrophy, epithelial downgrowths into the anterior chamber, and acute chemical burns. Our statistical survey confirms these impressions. Inflammatory lesions do not contraindicate the use of beta radiation, but only very small doses should be used.

Complications of Beta Radiation

Some of our patients had complications resulting from beta radiation. These included lens opacities, postradiation vessels, local ischemia, irritability, interference with wound healing, corneal thinning, epilation, epithelial changes, and ocular irritability. Our studies were designed to assess as far as possible the incidence, latent period, causative dosage, and clinical course of these complications.

Cataracts. We define cataract as any lens opacity visible to the experienced examiner with the aid of the ophthalmoscope or slit lamp. Cataracts have been found in both rabbits and human beings after exposure to radium, radon, or radioactive strontium.[2,8,12] The opacities in human lenses have usually not been associated with visual impairment.

Application of radiation to the limbus is most likely to produce lens opacities, because here the sensitive germinative cells at the equator are only 3 mm. from the surface, and they receive approximately 12 per cent of the surface dose from radon or Sr^{90}.

In this study, no radiation cataracts were observed in any of the 192 cases treated for conditions of the lid.

Of 554 eyes in which the beta applicator was placed directly on the globe, the presence or absence of lens opacities could not be determined in 320 eyes because of cloudy corneas, lack of adequate follow-up, or the associated presence of senile opacities. An additional 21 eyes had cataracts which could not be attributed to the previous radiation.

There were, therefore, 213 eyes in which the presence or absence of radiation lens opacities could be determined. Forty-five per cent of these had definite radiation opacities; an additional 12 per cent had probable radiation opacities; and the remainder, 44 per cent, had no opacities.

No opacities were seen less than 2.5 years after radiation. The incidence was

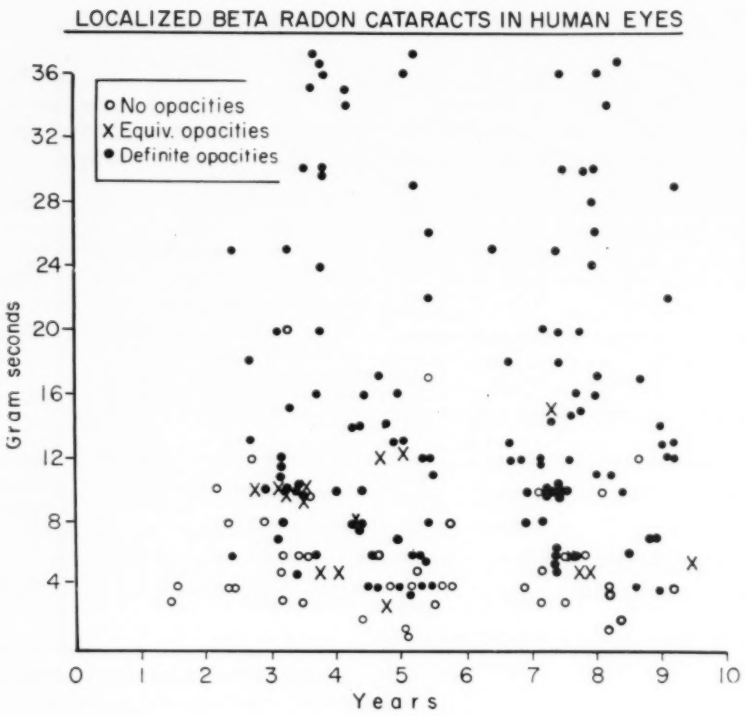


FIGURE 2.

21 per cent in patients with two to three years' follow-up, 50 per cent with three to four years' follow-up, 81 per cent in those examined after a lapse of five years, 77 per cent in five to seven years' follow-up, and 90 per cent when the last examination was more than seven years after radiation. The high incidence of these opacities only after three and four years is an indication of the long latent period for beta radiation opacities.

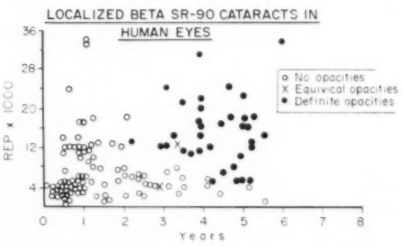


FIGURE 3.

The incidence, latent period, and causative dose of postradiation complications are shown in figures 2 and 3. The scattergram for radon (fig. 2) shows the earliest beta radon opacity after approximately 2.5 years, the smallest dose producing a definite opacity being 4 gram seconds. The X's indicating probable beta opacity are scattered along the threshold dose level and are more common in the years near the beginning of the latent period.

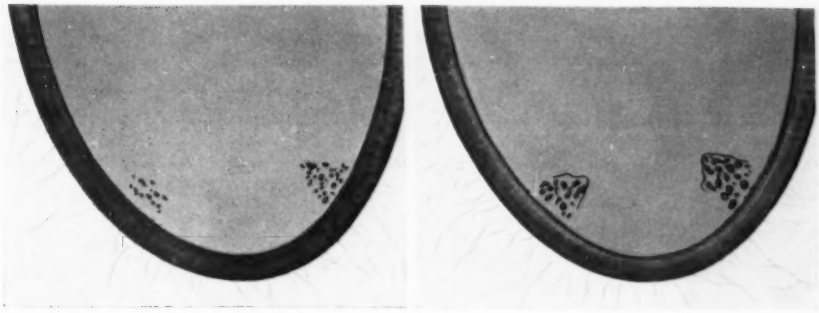


FIG. 4—(Left) Beta radiation lens opacities. (Right) Same eye four years later.

The scattergram for Sr^{90} (fig. 3) shows a similar latent period and the threshold cataractogenic dose of about 5,000 rep. When a similar scattergram was constructed in a report in 1954,[8] no Sr^{90} opacities had yet been observed, but their appearance was predicted.

Typically, the beta radiation opacities occurred in sectors; each began in the equatorial region of the lens beneath the treated limbal area. They consisted of subcapsular, dustlike granular opacities and tiny vacuoles arranged in a wedge-shaped pattern, extending both anteriorly and posteriorly from the lens equator. Progression took place by migration of these vacuoles posteriorly toward the posterior pole.

A comparison of the appearance of radiation opacities in 1953 and again in the same patients in 1957 provided information as to the course of these opacities: 79 per cent showed a progression in both area and intensity; 11 per cent had no progression; and 9 per cent showed actual regression of the lens opacities. It should be emphasized that the rate of progression was very slow. Only 15 per cent of the radon opacities, and 5 per cent of the Sr^{90} opacities reached the posterior pole*, where they might interfere with vision. Only 1.6 per cent of the opacities became sufficiently intense to warrant cataract extraction. A typical beta opacity and the changes which occurred over a four-year period are illustrated in figure 4.

In summary, beta radiation cataracts appear approximately 2.5 years or later, following radiation. Any dose over 4 gram seconds of radon or 5,000 rep of Sr^{90} has a significant chance of producing them.

Postradiation vessels. Postradiation vessels are telangiectatic vessels appearing in the immediate neighborhood of the irradiated area (fig. 5). They are of little importance except from a cosmetic standpoint. There is a latent period of

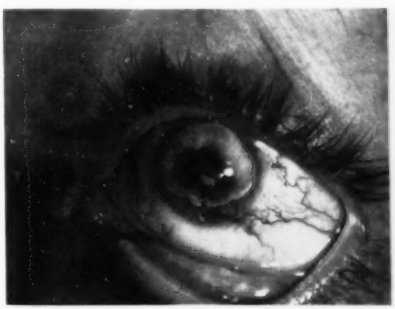


FIG. 5—Telangiectatic postradiational blood vessels.

*The total eye dose on these opacities ranged from 23 to 53 gram seconds of radon and 69,000 rep of Sr^{90}.

TABLE IX

DEVELOPMENT OF POSTRADIATIONAL TELANGIECTASIS WITH PASSAGE OF TIME

TELANGIECTASIS	LESS THAN 1 YEAR (%) (93 CASES)	1-5 YRS. (%) (110 CASES)	5 YRS. (%) (144 CASES)
None	100	40	11
Visible only with slit lamp	0	15	13
Grossly visible	0	26	35
Cosmetic blemish—mild	0	16	31
Cosmetic blemish—severe	0	3	10

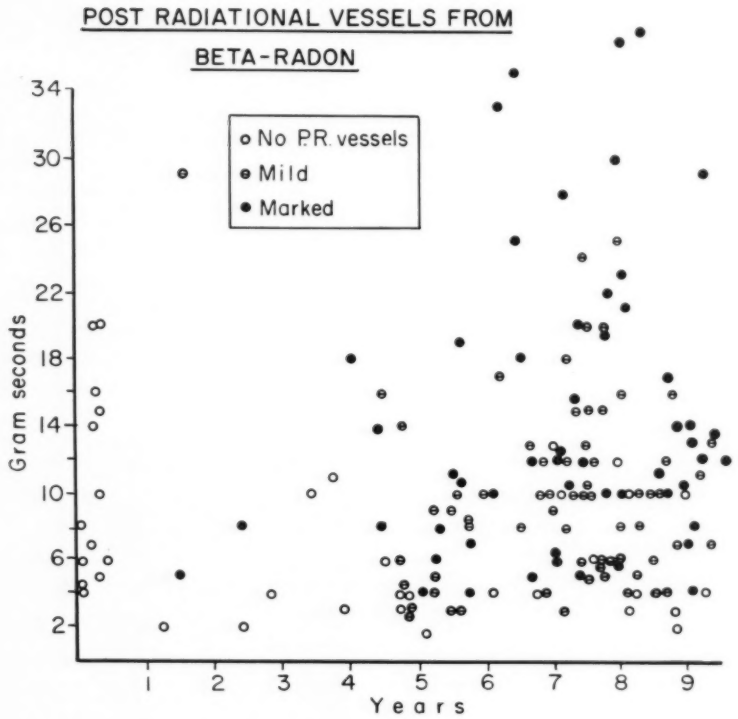


FIGURE 6.

more than one year and an increasing rate of incidence through the seventh year (table IX). Also, severity was greater with further follow-up. The threshold dose for postradiation vessels appears to be about 3 gram seconds of radon (fig. 6), and about 4000 rep of Sr^{90} (fig. 7). Whether these vessels are

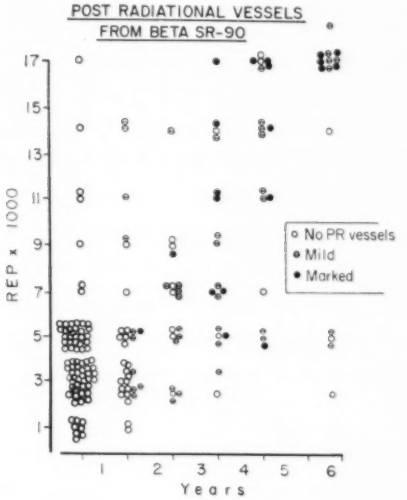


FIGURE 7.

new or are telangiectatic changes in vessels already present, we are unable to say. Although more common on the globe, postradiation vessels were seen also after radiation to the lid, but being buried in tissue, the skin or the palpebral conjunctiva, they appear to be of no consequence.

Interference with wound healing. In rabbits, interference with corneal wound healing after beta radiation has been reported previously,[9] and the present clinical cases tend to confirm these results (table X).

Twenty-three penetrating corneal transplants were performed on patients who had previously had beta radiation. The results were poor. Only two had excellent grafts, and the dose of radiation used in one of these patients was only 1.5 gram seconds of radon. One other graft was partially clear, and the others showed varying degrees of opacity from moderate clouding to porcelain-like opacity.

In nine of 17 cases, postradiation interference with wound healing might have been a factor: spontaneous perforation of graft (three cases), graft necrosis and ulceration (two cases), fistulous bleb around the suture track (one case), and persistent pitting of the suture track (three cases). These evidences of poor healing were in patients who had received radiation one month to six years prior to corneal transplantation.

Results following other penetrating surgical procedures were also unsatisfactory (table XI). Faulty wound healing occurred in five of 10 corneal sections in patients who had received radiation one month to nine years prior to surgical intervention.

With the lack of a suitable control series, it is difficult to determine whether the high incidence of opaque corneal grafts and poor wound healing in this series could be attributed directly to the previous beta radiation. Those cases requiring beta radiation before keratoplasty represent a selected group with a poor prognosis to begin with. However, it was felt that some of the more serious evidences of faulty wound healing, such as necrosis, perforation of the graft, and fistulizing corneal sections, ordinarily would not be expected so frequently as seen in the irradiated cases.

Corneal thinning occurred in about nine per cent of the cases, but after doses far in excess of those used at the present time. The thinning appeared to

TABLE X

RESULTS OF CORNEAL TRANSPLANT

BETA NO.	GRAFT CLARITY	WOUND HEALING INTERFERENCE	TOTAL DOSE TO EYE	BETA-SURGERY INTERVAL
365-2	Opaque	?	25 gs.	9 mos.
469-3	Opaque	?	53 gs.	3 mos.
264-7	Opaque	None	22 gs.	9 yrs.
255-5	Opaque	Yes Suture grooves pitted 4 yrs. later	46,000 rep	2 yrs. 9 mos.
240-5	Opaque	Yes Host sloughing after graft	10 gs.	6 yrs.
035-7	Opaque	None	7 gs.	3 yrs. 6 mos.
509-6	Opaque	None	40,000 rep	2 yrs.
016-1	Opaque	Yes Graft necrosis	46 gs.	1 yr.
625-5	Clear	None	40,000 rep	11 mos.
218-8	1st opaque	Possible Pseudomonas infection of graft	15 gs.	6 yrs.
	2nd opaque	None	15 gs.	6½ yrs.
424-3	1st opaque	Unknown	40,000 rep	1 week
	2nd opaque	Yes Suture tracts still pitted 8 months later	40,000 rep	6 mos.
280-6	Clear	None	1½ gs.	3 yrs.
267-2	Opaque	Yes Spontaneous perforation-enucleated	28 gs.	1 mo.
046-5	Opaque	Yes Ulcerated at 6 o'clock	58 gs.	5 yrs.
179-7*	Clouding	None	53 gs.*	4 yrs.
242-5*	1st opaque	Unknown	36 gs.*	4 yrs.
	2nd opaque	Unknown	36 gs.*	5 yrs.
	3rd opaque	Yes Marked thinning of suture tracts in radiated area	36 gs.*	6 yrs.
242-6*	Cloudy in part	None	12 gs.*	3 yrs.
380-5	2++ clouding	None (Lamellar)	18 gs.	4 yrs.
264-7	2++ clouding	None (Lamellar)	22 gs.	7 yrs.
208-6*	2++ clouding	Yes (Lamellar) Still had fistula bleb at suture tract 2½ yrs. later	31 gs. plus x-ray	6 yrs.

*Received other radiation in addition to this dose of beta.

TABLE XI

RESULTS OF OTHER PENETRATING SURGERY AFTER BETA

BETA NO.	OPERATION	EVIDENCE OF POOR WOUND HEALING	TOTAL DOSE TO EYE	BETA-SURGERY INTERVAL
274-7	Cat. Ext.	None	10 gs.	4 mos.
081-2	Cat. Ext.	None	10,000 rep	2 mos.
238-7	Cat. Ext.	Yes Persistent flat chamber 28 days in spite of two air injections and post sclerotomy. Secondary glaucoma.	9 gs.	4 mos.
264-8	Cat. Ext.	Yes No conjunctival healing for 5 weeks.	42 gs.	9 yrs.
228-6	Cat. Ext.	Yes Filtering bleb; area of suture tracts show remarkable pitting.	41 gs.	2 yrs. 5 mos.
297-2	Cat. Ext.	Possible Anterior chamber shallow one month post beta.	20 gs.	1 yr.
374-3	Cat. Ext.	None	25 gs.	5 yrs.*
374-4	Cat. Ext.	Yes Filtering cicatrix lasting at least 2 yrs.	51 gs.	3 yrs.*
179-7	Cat. Ext.	None	5 gs.*	5 yrs.
266-1	Optical Iridectomy	Yes Filtering bleb for 3 weeks postoperative	53 gs.*	1 yr.+
335-2	Optical Iridectomy	None	41 gs.	1 mo.

*Received other radiation in addition to this dose of beta.

change little, if any, and was considered permanent.

Keratinization of the Conjunctival Epithelium. Although this complication was observed by Merriam[11] both grossly and in conjunctival scrapings after low as well as moderate doses of beta radiation, no keratinization of the conjunctival epithelium was observed in this series except in a few cases after beta radiation at the lid margin; this resulted in an overgrowth of the keratinized epithelium from the skin onto the conjunctival side of the lid (fig. 8).

FIG. 8—Keratinization of lid margin after beta epilation.

In 23 cases averaging two years since irradiation, however, one of us (FMW) made conjunctival scrapings from areas which had received 1,000 to 31,000 rep, and also from the corresponding areas in the nontreated eye. No significant difference was demonstrated between the conjunctival scrapings of the treated and the control areas.

There were a few cases of advanced vernal catarrh of the upper lids, associated with cobblestone vegetations, in which unusually high doses of radon had been given many years ago; the treatment resulted in elimination of the cobblestone vegetations and gave comfort, but keratinization of the conjunctival epithelium has not been seen in such cases, although these areas appeared relatively blanched out and scarred.

Ocular Irritability Following Radiation. As reported previously, patients may experience symptoms of minor irritability a few hours or occasionally a few days following treatment. Several years ago, after some patients received a total of 15 gram seconds of radon or more, conjunctivitis and superficial punctate erosions of the cornea developed which cleared spontaneously in a few weeks. With the smaller dosages used clinically at present, however, postirradiation irritability presents no problem. The irritability which follows beta epilation in some cases is an exception to this statement.

Glaucoma Following Beta Radiation. No further information is available since the last report concerning the possibility of glaucoma being related to intensive beta radiation therapy around the limbus. Although a few such patients had glaucoma, this might well have been due to the underlying pathologic process rather than to the radiation itself.

CONCLUSION

Beta radiation ophthalmic applicators, especially those with radioactive Sr^{90}, provide a ready source of radiotherapy for superficial lesions of the eye. A survey of 694 beta-radiated eyes is reported. The results of this survey indicate that these beta particles produce effects on ocular tissue which are more or less predictable in incidence and latency. Our paper discusses these effects, both the desirable and the undesirable ones, attempts further to define the latent period, dose of production, incidence, and clinical course of these effects. This type of therapy is effective in treating corneal vascularization, especially that occurring in rosacea keratitis. It is of value as an adjunct to surgical procedures in the treatment of recurrent pterygiums. It is especially indicated in limbal tumors with or without associated surgical excision. It seems to have some use in inflammation and allergic conditions of the cornea and also in certain lid conditions. It is associated with complications such as lens opacities, postradiation vessels, interference with wound healing, and others.

In general, because of its narrow margin of safety, beta radiation should be used only in those conditions for which it is superior to other forms of treatment, or in which other treatment has failed, but in all cases its side effects and destructive nature demand the most careful and conservative selection of clinical indications for beta irradiation of the eye.

REFERENCES

1. Haik, George M.; Waugh, Richey L., Jr.; Lyda, Wood, and Ellis, George S.: The management of pterygia with particular reference to recurrent pterygia, South. M. J., 45:832-839 (Sept.) 1952.

2. ———: Cataract formation following beta-ray radium therapy, Am. J. Ophth., 38:465-470 (Oct.) 1954.

3. Hughes, William F., Jr.: Beta radiation therapy in ophthalmology, Tr. Am. Ophth. Soc., 50:469-549, 1952.

4. Hughes, William F., and Iliff, Charles E.: The effects of beta irradiation on the rabbit's eye, Am. J. Roentgenol., 56: 502-512 (Oct.) 1946.

5. Kastner, J., and Greenberg, L.: Measurement of beta-ray applicators, Radiology, 58:731-739 (May) 1952.

6. King, John Harry, Jr.: The pterygium, A.M.A. Arch. Ophth., 44:854-869 (Dec.) 1950.

7. Krohmer, Jack S.: Physical measurements on various beta-ray applicators, Am. J. Roentgenol., 66:791-796 (Nov.) 1951.

8. McDonald, James E.; Hughes, William F., Jr., and Peiffer, Vincent G.: Beta radiation cataracts, A.M.A. Arch. Ophth., 53:248-259 (Feb.) 1955.

9. McDonald, James E., and Wilder, Howard C.: The effect of beta radiation on corneal healing, Am. J. Ophth., 40:170-180 (Nov., pt. II) 1955.

10. McGavic, John S.: Surgical treatment of recurrent pterygium, Arch. Ophth., 42: 726-748 (Dec.) 1949.

11. Merriam, George R.: Late effects of beta radiation on the eye, A.M.A. Arch. Ophth., 53:708-717 (May) 1955.

12. von Sallmann, Ludwig; Munoz, Carmen M., and Drungis, Anne: Effects of beta irradiation on the rabbit lens, A.M.A. Arch. Ophth., 50:727-736 (Dec.) 1953.

13. Wilson, Fred M.: The beta applicator as an ophthalmic therapeutic tool, J. Internat. Col. Surg., 57:723-730 (June) 1957.

14. ———: Clinical and experimental experiences with beta irradiation of the eye, Tr. Am. Ophth. Soc., in press.

RADIOTHERAPY COMPARED TO OTHER FORMS OF OCULAR THERAPY

WILLIAM F. HUGHES, M.D.
CHICAGO, ILLINOIS

THE previous speakers on this symposium have made it evident that there are many different sources of radiation which can be used therapeutically, both electromagnetic and particulate, although all of them primarily produce their biologic effects by ionization. As pointed out by Dr. Evans, the absorption of radiant energy can produce gene mutation, delay in mitosis, formation of abnormal chromosomes, and death of the cell, due in part to the formation of toxic chemicals in the tissue. Chromosomal abnormalities following irradiation have been demonstrated in flat preparations of the corneal epithelium by Friedenwald, Buschke and others, and in the lens epithelium by von Sallmann and his colleagues[55] as soon as ten minutes following exposure. Also in this symposium, von Sallmann has demonstrated early changes in the cytoplasm. It thus appears that the effect of absorption of ionizing radiation is destructive, certain cells are more sensitive than others, and some recovery is possible.

As pointed out previously, only that radiation which is absorbed produces an effect on tissue. The unit of absorbed dose is termed a "rad," equal to the absorption of 100 ergs of energy per gram. Although the absorption in tissue cannot be measured directly, certain known factors permit radiologists to calculate the all-important *tissue dose:* viz. (1) the quantity of radiation coming from the x-ray machine or isotope measured in r, rep, or rad in air; (2) the percentage of radiation which reaches the area of tissue under consideration, or *depth dose,* which is related to the quality of the radiation including voltage and *half value layer;* (3) the absorption coefficient which differs greatly for bone and soft tissue; and (4) the energy required to produce an ion pair.

When the tissue dose is known for different types of radiation, it is possible and necessary to determine the sensitivity of the normal tissues which are to be preserved as much as possible in the treated area, and the sensitivity of the pathologic tissues which are to be destroyed. This ratio of tissue tolerance to lethal dose (therapeutic ratio) is of practical clinical importance when deciding how much benefit radiation might have for a specific disease or tumor in a specific location (fig. 1).[38] At the lower ends of the sigmoid curves it requires a rather large increase in dose to destroy 10 per cent of the normal or tumor tissue. Then, with little increase in dose, there is a rapid rise in the percentage of cases which respond to radiation. The dose which will completely destroy a tumor in 80 to 90 per cent of the cases has been termed the *tumor lethal dose* or *cancericidal dose (TLD).* Above this,

From the Departments of Ophthalmology of the Presbyterian-St. Luke's Hospital and the University of Illinois College of Medicine.

Presented at the Sixty-Third Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 12-17, 1958, Chicago.

the dose must be increased considerably to cure the last 10 to 20 per cent of the cases. A favorable therapeutic ratio between normal and tumor tissue is illustrated in figure 1, and the point B is selected as the desirable dose, since it will produce the greatest percentage of cures with the least amount of damage to the normal tissues.

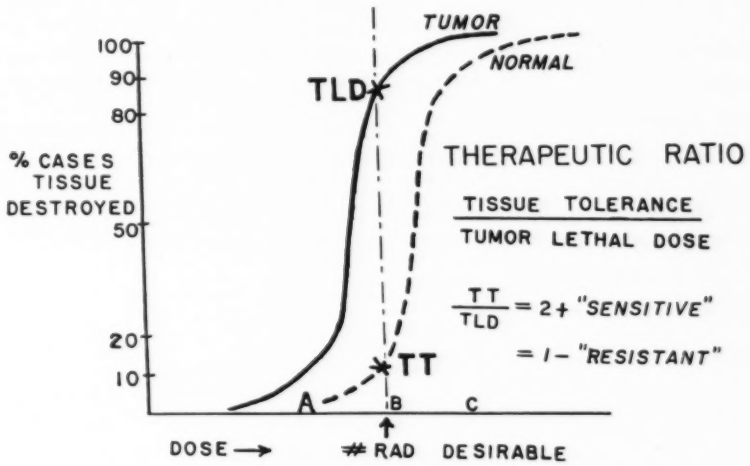


FIG. 1—Relation of the tissue tolerance and tumor lethal dose in ionizing radiation.

During the past several years, data have been accumulating, much of it obtained by members of this symposium, regarding the tolerance of various structures of the eye to radiation, and the curative dose for certain pathologic tissues. In spite of the hazards of trying to simplify the enormous variables of the reactivity of tissue to radiation and the technical complexities of radiotherapy, it might be worth while to summarize data related to the therapeutic ratio, and to compare radiotherapy with other forms of ocular therapy in certain conditions.

TUMORS OF THE LID

Equally good results with approximately a 95 per cent eventual cure rate and satisfactory appearance are apparently obtained in cases of basal and squamous cell carcinomas of the lids by the use of fractionated x-ray therapy,[1,35,47,52] surgery with plastic repair,[40,41] implantation of radium needles,[24] or chemosurgery.[34] X-ray therapy seems particularly desirable in older people who wish to avoid a surgical operation and hospitalization, and in lesions around the inner canthus where surgical procedures might interfere with lacrimal drainage. Surgical removal by an ophthalmologist with an interest also in plastic repair produces excellent cosmetic results in early lesions, and radical surgical procedures such as exenteration and resection of bone may be necessary in combination with radiotherapy in ex-

TABLE I

TUMORS OF LID

TYPE	HVL (MM)	(1000 RAD) TT	(1000 RAD) TLD	Rx
Carcinoma				
Small	1-2 Al	<3 (S) >5 (F)	3 (S) 4-5.5 (F)	X-ray (F), Surgery, or Chemosurgery
Large	1.5 Cu	>5 (F)	3-4 (F)	X-ray (F), or Chemosurgery
Inner Canthus	1.5 Cu	>5 (F)	3-5.5 (F)	X-ray (F). Surgery if adherent to bone
Meibomian and Zeis	1.0 Cu	>5 (F)	4.5-5.5 (F)	Surgery and X-ray if necessary
Benign Tumors				Surgery
Malignant Melanoma				Surgery

S=Single dose

F=Fractionation and protraction: e.g., 200 to 400 rad from 3 to 7 days a week for 2 to 6 weeks

TT=Tissue tolerance

TLD=Tumor lethal dose

HVL=Half value layer

TABLE II

TUMORS OF ORBIT AND ADNEXA

TYPE	HVL (MM)	(1000 RAD) TT	(1000 RAD) TLD	Rx
Lacrimal Gland				
Benign Mixed	—	—	—	Complete Excision
Carcinoma	1.5 Cu	—	5	Radical Surgery, with X-ray if necessary
Lacrimal Sac	1.0 Cu	—	4-5	Excision with X-ray if necessary
Lymphomas:				
Conjunctiva	0.1 Al	>3	3	500 rad × 6 (2 wks.)
Lid	0.1 Al	>4	3-4	500 rad × 6-8 in 2-3 weeks
Lacrimal Sac	1.0 Cu	>3	3	500 rad × 6 (3 wks.)
Orbit	1.0 Cu	>3	3	500 rad × 6 (2 wks.)

tensive infiltrations and recurrences. It is almost impossible to screen an eye completely when radium needles are used, although this technique requires few office calls. In chemosurgery, as first described by Mohs,[34] the tumor is first fixed by zinc chloride paste, then excised and mapped out for histologic study to determine whether there are any areas in which tumor remains on the under or peripheral surface of the specimen. Such "iceberg" or "tinker-toy" prolongations are then fixed and excised. Although requiring specially trained technicians, this method gives more assurance of removal of the entire tumor with the minimal loss of normal tissue. Relatively rare tumors of the Meibomian or Zeis glands are best treated surgically, although they apparently are somewhat sensitive to radiotherapy if it is needed in addition.[48]

ORBITAL TUMORS

There is little to add to Dr. Schulz's discussion of the management of orbital tumors, except to echo the pleas of several ophthalmologists[15,33,42] for more accurate diagnosis of lacrimal gland tumors and for radical surgical removal in cases of carcinoma. Radiotherapy is the treatment of choice for lymphomas. McGavic[29] has given some encouragement that an ocular lymphoma does not necessarily indicate a systemic disease, only one half of his 20 patients dying of lymphoma in a follow-up period of over fifteen years. In cases of progressive or malignant exophthalmos associated with thyroid disease, there is no good evidence that irradiation of either the pituitary or the orbit is helpful.[19]

HEMANGIOMAS

Vascular tumors often pose a problem in management; witness the many forms of treatment which have been suggested. About one half of small "strawberry marks" in infants disappear spontaneously within five years. However, in a survey of 1,113 cases of hemangioma, Andrews and his colleagues[2] implied that there was also much wishful thinking in the conservative management of these tumors. Of 102 cases of untreated hemangioma simplex, only 51 per cent involuted spontaneously and most of these were less than one centimeter in diameter. Larger tumors may ulcerate or cause pressure damage to the eye or orbit and are better treated early. In the past, excessive doses of radiation have resulted in undesirable late sequelae; this has been particularly true in infants, in whom development of the bony orbit might be hampered. However, in large, progressive, and relatively superficial hemangiomas, small doses of radiation may be given. Andrews and his colleagues pointed out that 84 per cent of cavernous hemangiomas persist longer than five years. In general, surgical excision of these tumors, which are usually deep within the lids or in the orbit, is the most desirable treatment, especially when they are disturbing the functioning of the eye.

EXTERNAL OCULAR CONDITIONS

The tolerance of the structures of the anterior ocular segment to radiation becomes exceedingly important when radiotherapy is applied to the eye itself. In table IV some of the more recent data are summarized,[3,7,8,28,31,49,54,56,57,58] although much of this is necessarily tentative and some of it has been determined only on animals. The cornea is relatively resistant, at least the stroma, and will allow x-ray therapy up to 4000 rad in fractionated doses and probably more of beta radiation without permanent damage or opacification. Information on the tolerance of the human lens to radiation has been greatly enhanced by reports of

TABLE III

HEMANGIOMAS

TYPE	HVL (MM)	(1000 RAD) TT	(1000 RAD) TLD	RX
Port-Wine Stain	—	Low	High	Cosmetics or Surgery
Hemangioma Simplex "Strawberry Mark" 1 cm. or less	—	—	—	Involution <5 years, CO_2 snow
Large, Progressive	1-2 Al	?	?0.5-2.0	200-400 r every 1-2 months (not in infants). Surgery
Angiomatosis Retinae	—	—	—	Diathermy, Photocoagulation
Cavernous (Orbit)	—	—	—	Surgery, ?Sclerosing solution
Racemose (A-V): Orbit and Retina	—	—	—	Ligation, ? X-ray
Angiosarcoma	1.5 Cu		?4-5	Radical Surgery with X-ray if necessary

TABLE IV

MAXIMUM TOLERATED DOSE OF RADIATION TO ANTERIOR OCULAR TISSUES (1000 RAD)

TISSUE	X-RAY GRENZ	HVL 1.5 CU	BETA Sr^{90}-Y^{90}	BETATRON BETA & X-RAY	NEUTRONS
Epilation	—		3 (H)	0.8-1.6	1.5×10^{11} N/cm^2
Cornea	<4	<4 (H,F)	<20 MID < 2 W-H	2.4 (<3.2)	—
Iridocyclitis	—	0.2	—	<2.4	—
Lens: Max. Tol. Dose	—	<0.075* 0.175 (H)	< 0.6 (H)**	<0.2	—
Minimal Cat.	—	0.075-0.25* 0.2 (H) 0.4-0.55 (H,F)	0.6 (H)** 0.06-0.12**	0.2-0.8	$<2 \times 10^9$ N/cm^2
Progressive Cat.	—	0.5* 0.75-0.95 (H,F)	?0.9 (H)**	1.6	8×10^9 (10 mev) 3×10^{10} (0.3 mev)

H=Human
F=Fractionated and protracted
*=1.2 mev x-ray
**=Depth dose of 12 per cent of surface dose at 3 mm. from surface of limbus
MID=Minimum inflammatory dose (produces corneal nebula in rabbits)
W-H=Wound healing

TABLE V

EXTERNAL OCULAR CONDITIONS

CONDITION	KV	1000 RAD	BETA 1000 RAD EACH AREA	Rx
Corneal Vessels				
Rosacea Keratitis		—	4-6	Corticosteroids, Beta
Recurrent Pterygium	25	0.5 × 6	2-4	Surgery and Radiation postoperatively 1 week
Post-Keratoplasty	20	0.5 × 6	1 × 2	Steroids and, if necessary, postoperatively 2-3 weeks, Radiation
Limbal Tumors				
Papilloma	—	—	3	Excision or Radiation
Epithelioma	—	—	5	Excision or Radiation
Precancerous Melanosis	15	0.5 × 6	3-5	
Vernal Catarrh				
Palpebral	—	—	5 each dose	Steroids and, if necessary, Rx Beta
Limbal	—	—	2-3	
Allergic Keratoconjunctivitis	15	0.5 × 3	2-3	
Trichiasis	—	—	3	Electrolysis, Surgery, Radiation
Inflammations	15	0.5	0.5-1.0	Indolent, unresponsive to Rx, ? try Radiation

Cogan and Dreisler[7] and Merriam and Focht,[31] and the current survey by McDonald and Wilson (p. 468 of this issue).

For x-radiation, it appears that a single dose of 200 rad, or 400 to 500 rad of x-ray in fractionated doses, can produce a cataract; that 600 to 1000 rad in fractionated doses produce cataracts in a little over one half of the cases, half of which are progressive; and that total doses over 1000 rad are almost certain to result in lens opacities. Similar results are found for beta radiation, in which a surface dose of 5000 rad applied to the limbus, or a depth dose of 600 rad at the equator of the lens, will result in peripheral lens opacities. There is some evidence that a considerable proportion of the peripheral lens must be exposed in order for cortical opacification to develop. Neutrons may be as much as ten times more cataractogenic than electromagnetic or beta rays with equivalent amounts of ionization or rads.[6,8] Several years ago, Evans[13,14] found that repeated exposures with neutrons were more cataractogenic than x-ray, suggesting a relative lack of recoverability and greater cumulative effect, perhaps because the resting cells of the lens epithelium are more affected by neutrons.

With these facts in mind, it is still possible to treat the anterior segment of the eye safely with x-ray or beta particles but not with neutrons. As reported by Forrest for relatively superficial x-rays, and by McDonald and Wil-

son for beta radiation, there are several external ocular conditions in which radiotherapy is useful (table V). Rosacea keratitis, recurrent pterygium in which radiation is used soon after reoperation, limbal tumors, and vernal catarrh have been especially responsive. The local use of corticosteroids, particularly hydrocortisone and prednisolone, has reduced the numbers of cases of corneal vascularization and vernal catarrh which require radiotherapy, but some resistant cases remain. The results of primary treatment of limbal tumors of epithelial type with beta radiation have been excellent. Although excision of these tumors is usually effective, it is worthy of note that Ash[2a] in 1950 reported recurrences varying from 13 to 33 per cent, although only rarely did they invade the globe or orbit, or metastasize.

Although it has been repeatedly stated that conjunctival nevi are not sensitive to radiotherapy, precancerous melanosis of the conjunctiva appears to respond to reasonable doses. Recently, Lederman[23] reported remarkable results also in malignant melanomas of the conjunctiva, both at the limbus and in five cases of cancerous melanosis. In 26 patients treated with radiotherapy with or without limited surgical intervention, 19 were living and well, 3 out of 7 for five years and 7 out of 10 for three years. These results suggest that exenteration of the orbit may not always be necessary for malignant melanoma limited to the conjunctiva, although the author stated that malignant melanoma of the skin is radioresistant.

EPITHELIAL DOWNGROWTH INTO THE ANTERIOR CHAMBER

Time does not permit a complete discussion of the management of epithelial downgrowth into the anterior chamber following injury or operation. The elimination of localized cysts has been accomplished by a number of methods, perhaps the most reliable being excision. The early diagnosis of the downgrowth of an epithelial membrane may be so difficult, the importance so great, and the treatment so serious that the removal of tissue for biopsy by curettage through a small incision has been recommended. Maumenee and Shannon[27] recommended surgical removal by curettage and basal iridectomy if the epithelial membrane does not cover more than one third of the cornea and if there is no glaucoma suggesting extensive involvement of the angle. This is a somewhat formidable although necessary procedure in early cases. Low voltage x-ray has been used frequently. A review of the published results[16,17,22,25,27,30,36,39,44,50,51,53] and our own experience would suggest that at least 2500 rad is required to halt the growth of or possibly to eliminate an epithelial downgrowth, and the eye will tolerate about 4000 rad, especially if the uninvolved portion of the cornea is screened. Reports of success with lower doses of x-radiation probably represent mistaken diagnoses.

TABLE VI

TREATMENT OF EPITHELIAL DOWNGROWTH INTO ANTERIOR CHAMBER

Cysts:
1. Excision
2. Electrolysis
3. Diathermy
4. Sclerosing Solutions: e.g., Iodine

Membrane: Biopsy
1. Early (<⅓ Corneal) Excision and Curettage
2. X-ray:
   a. Screen Lower Cornea with Waxed Lead
   b. 50-100 KV Unfiltered X-ray
   c. 200-300 rad twice a week
   d. Total Dose = 2500-4000 rad

TABLE VII

MAXIMUM TOLERATED DOSE OF RADIATION TO POSTERIOR OCULAR TISSUES (1000 RAD)

TISSUE	X-RAY & GAMMA	BETATRON
Sclera	? 125 (H)	—
Choroid	<6 (H)	—
Retina: Rods	<1.7	3.2
Cones	10. <9. (H)	—
Vessels	>30. less than 5-9 (H)	—
Optic Nerve	7 (H)	>4

H=Human

RADIOSENSITIVITY OF POSTERIOR OCULAR STRUCTURES

Although the rods and, to a less extent, the external layers of the retina and retinal vessels are moderately sensitive to radiation in animal experiments,[4,5] the tolerance of the posterior tissues of the human eye is apparently sufficient to permit radiotherapy.

TREATMENT OF RETINOBLASTOMA

Forrest, working with Reese, has presented the latest results of their extensive work on the management of bilateral retinoblastoma. From data obtained both from x-ray and radon-treated eyes, it appears that a tumor dose of approximately 3500 rad is required to destroy most retinoblastomas. Although the local application of gamma therapy in the form of radon needles or radioactive cobalt (Co^{60}) discs, as performed by Stallard[45,46] and others,[18,21] provides adequate radiation in the specific areas with perhaps less over-all exposure of the eye, the frequent problem of multiple tumors and seeding probably makes x-ray therapy more desirable in most cases. The use of a chemotherapeutic agent such as TEM simultaneously with radiotherapy in these extensive tumors

TABLE VIII

TREATMENT OF RETINOBLASTOMA

1. Enucleation of worst eye with 10 mm. nerve
2. If less than one third of other eye involved:
   a. I-M TEM plus x-ray (3500 rad)
   b. Co^{60} discs or radon needles (3500 rad) sutured on sclera
   c. Diathermy
   d. Photocoagulation
3. If more than one third of other eye is involved, if there are multiple nodules, or if there is seeding in vitreous:
   a. Enucleation
   b. Intracarotid TEM plus x-ray
4. Residual tumor in nerve or recurrence in orbit: Radon needles plus x-ray (4000-6000 rad) plus intracarotid TEM

may provide an additive or perhaps synergistic effect, and the early results of such therapy are encouraging.[43] We should not forget the treatment of small, localized nodules of retinoblastoma by diathermy coagulation,[11,20,37] and Dunphy[12] has recently added eight such cases to the literature with only two failures. At the recent meeting of the International Congress of Ophthalmology and again before this Academy, Meyer-Schwickerath[32] has showed that retinoblastomas as well as melanomas could be coagulated with his photocoagulator. These various methods provide the ophthalmologist with some selectivity of treatment for different types of cases.

METASTATIC TUMORS TO THE CHOROID

Metastatic tumors appearing in the posterior portion of the choroid, usually from the breast, gastrointestinal tract, or lungs, require local treatment even though the prognosis for life is only about eight months. Fortunately, an attack on an ocular metastatic lesion by radiotherapy[10] or hormones[9] usually results in a regression of the tumor sufficient to provide useful vision.

CONCLUSIONS

Members of this symposium have presented some of the fundamental mechanisms of action of radiotherapy on the ocular tissues, and they would like to stress that there are specific indications for curative therapy. With increasing knowledge of the tolerance of the ocular tissues for radiation, treatment can be administered in dosage sufficient to effect cures without undue damage to the normal tissues rather than in timid homeopathic doses or for palliative effects only. As Dr. Schulz stated so well, "Radiotherapy is not a means of improving the results of unwisely chosen and poorly executed surgical removal, nor should surgical procedures be used by the radiotherapist habitually as a cleaning up device." Because of the possibility of late complications if excessive radiotherapy has been used, it should be reserved for those conditions in which it is definitely superior to other methods of treatment, or in which other methods of treatment have failed, especially in the radiotherapy of nonmalignant lesions.

TABLE IX

TREATMENT OF METASTATIC TUMORS TO CHOROID

1.	X-ray, HVL 1.2 mm. Cu, 300 rad daily (Total tumor dose—3000-4000 rad)
2.	Hormones: Androgens (Premenopausal) or Estrogens (Postmenopausal): Corticosteroids
3.	Surgical castration plus Adrenalectomy

REFERENCES

1. Andrews, George C.; Domonkos, Anthony N., and Hurlbut, Wilbur B.: Roentgen irradition in the treatment of epithelioma, J.A.M.A., 154:21-22 (Jan. 2) 1954.

2. Andrews, George C.; Domonkos, Anthony N.; Torres-Rodriguez, Victor M., and Bemhenista, John K.: Hemangiomas—treated and untreated, J.A.M.A., 165: 1114-1117 (Nov. 2) 1957.

2a. Ash, J. E.: Epibulbar tumors, Am. J. Ophth., 33:1203-1219 (Aug.) 1950.

3. Biegel, Albert C.: Experimental ocular effects of high-voltage radiation from the betatron, A.M.A. Arch. Ophth., 54:392-406 (Sept.) 1955.

4. Cibis, Paul A., and Brown, David V. L.: Retinal changes following ionizing radiation, Am. J. Ophth., 40:84-88 (Nov., pt. I) 1955.

5. Cibis, Paul A.; Noell, Werner K., and Eichel, Bertram: Ocular effects produced by high-intensity x-radiation, A.M.A. Arch. Ophth., 54:651-663 (May) 1955.

6. Cogan, David G.; Donaldson, David D.; Goff, John L., and Graves, Elizabeth: Experimental irradiation cataract. III. Fur-

ther experimental studies on x-ray and neutron irradiation of the lens, A.M.A. Arch. Ophth., 50:597-602 (Nov.) 1953.

7. Cogan, David G., and Dreisler, Knud K.: Minimal amount of x-ray exposure causing lens opacities in the human eye, A.M.A. Arch. Ophth., 50:30-34 (July) 1953.

8. Cogan, David G.; Goff, J. L., and Graves, Elizabeth: Experimental radiation cataract. II. Cataract in the rabbit following single exposure to fast neutrons, A.M.A. Arch. Ophth., 47:584-592 (May) 1952.

9. Cogan, David G., and Kuwabara, Toichiro: Metastatic carcinoma to the eye from the breast, A.M.A. Arch. Ophth., 52:240-249 (Aug.) 1954.

10. Dickson, Robert J.: Choroidal metastases from carcinoma of the breast, Am. J. Ophth., 46:14-18 (July) 1958.

11. Dunphy, Edwin B.: Management of intraocular malignancy, Am. J. Ophth., 44: 313-322 (Sept.) 1957.

12. ———: Report on the diathermy treatment of retinoblastoma, Am. J. Ophth., 45:95-99 (April, pt. II) 1958.

13. Evans, Titus C.: Effects of small doses of fast neutrons on mice, Radiology, 50: 811-834, 1948.

14. ———: The fast neutron hazard, Nucleonics, 4:2, 1949.

15. Forrest, Arnold W.: Epithelial lacrimal gland tumors: pathology as a guide to prognosis, Tr. Am. Acad. Ophth., 58:848-866 (Nov.-Dec.) 1954.

16. Friedman, Bernard B.: Treatment of epithelial ingrowth following cataract extraction, Am. J. Ophth., 27:764, 1944.

17. Gallardo, Edward, and Weidenheim, C. W.: Epithelial membrane in anterior chamber after cataract surgery, Am. J. Ophth., 39:868-870 (June) 1955.

18. Gibson, Walter Lockhart: Radon in the treatment of intraocular tumours, Tr. Ophth. Soc., Australia, 7:77-80, 1947.

19. Henderson, John W.: The problem of progressive exophthalmos in thyroid disease, J. Michigan M. Soc., 56:849-853, 1957.

20. Joseph, E., and Offret, G.: Two cases of retinal gliomas treated with electrotherapy, Bull. et mem. Soc. franc. d'opht., 65:299-302, 1952 (abstr., Ophth. Lit., 6: 678, June 1953).

21. Joyce, Arthur, and Scott, R. Kaye: Treatment of intra-ocular tumours with radon, XVII Concilium Ophthalmologicum, 1: 453-460, 1954.

22. Kennedy, Patrick J.: Treatment of cysts of the iris with electrolysis, A.M.A. Arch. Ophth., 55:522-525 (April) 1956.

23. Lederman, M.: Some applications of radioactive isotopes in ophthalmology, Brit. J. Radiology, 29:1-13 (Jan.) 1956.

24. Lehmann, C. F., and Pipkin, J. L.: Radium in malignant cutaneous disease, J.A.M.A., 154:4-8 (Jan. 2) 1954.

25. Long, John C., and Tyner, George S.: Three cases of epithelial invasion of the anterior chamber treated surgically, A.M.A. Arch. Ophth., 58:396-400 (Sept.) 1957.

26. Maumenee, A. Edward: Epithelial invasion of the anterior chamber; retinal detachment; corneal edema; anterior chamber hemorrhages; changes in the macula. In Symposium: Postoperative Cataract Complications, Tr. Am. Acad. Ophth., 61:51-68 (Jan.-Feb.) 1957.

27. Maumenee, A. Edward, and Shannon, C. Richard: Epithelial invasion of the anterior chamber, Am. J. Ophth., 41:929-942 (June) 1956.

28. McDonald, James E.; Hughes, William F., Jr., and Peiffer, Vincent G.: Beta radiation cataracts, A.M.A. Arch. Ophth., 53:248-259 (Feb.) 1955.

29. McGavic, John S.: Lymphomatous tumors of the eye, A.M.A. Arch. Ophth., 53:236-247 (Feb.) 1955.

30. Merriam, George R.: Radiotherapy of diseases of the eye [abstr. of a report before the New York Academy of Medicine, Section on Ophthalmology, Dec. 17, 1951], A.M.A. Arch. Ophth., 48:526-528 (Oct.) 1952.

31. Merriam, George R., Jr., and Focht, Elizabeth F.: A clinical study of radiation cataracts and the relationship to dose, Am. J. Roentgenol., 77:759-785 (May) 1957.

32. Meyer-Schwickerath, G.: Treatment of tumors by light coagulation. Presented at

the XVIII International Congress of Ophthalmology, 1958.

33. Milam, D. F., and Heath, Parker: Primary epithelial tumors of the lacrimal gland, Am. J. Ophth., 41:996-1006 (June) 1956.

34. Mohs, Frederic E.: Chemosurgical treatment of cancer of the eyelid, a microscopically controlled method of excision, Arch. Ophth., 39:43-59 (Jan.) 1948.

35. Osborne, Earl D.: Treatment of malignant cutaneous lesions, J.A.M.A., 154: 1-4 (Jan. 2) 1954.

36. Perera, Charles A.: Epithelium in the anterior chamber of the eye after operation and injury, Tr. Am. Acad. Ophth., 42:142-164, 1937.

37. ———: Treatment of retinoblastoma by diathermic coagulation, Am. J. Ophth., 34:1275-1278 (Sept.) 1951.

38. Petersen, A. S. J.: Personal communication, 1957.

39. Pincus, Morris H.: Epithelial invasion of anterior chamber following cataract extraction: effect of radiation therapy, Arch. Ophth., 43:509-519 (March) 1950.

40. Reeh, Merrill J., and Hyman, Selma: Treatment of lid tumors, Tr. Am. Acad. Ophth., 59:507-521 (July-Aug.) 1955.

41. Reeh, Merrill J., and Swan, Kenneth C.: Experiences with tumors of the lid, Tr. Am. Acad. Ophth., 54:312-325 (March-April) 1950.

42. Reese, Algernon B.: The treatment of expanding lesions of the orbit; with particular regard to those arising in the lacrimal gland, Am. J. Ophth., 41:3-11 (Jan.) 1956.

43. Reese, Algernon B.; Hyman, George A.; Merriam, George R., Jr., and Forrest, Arnold W.: The treatment of retinoblastoma, by radiation and triethylene melamine, Am. J. Ophth., 43:865-872 (June) 1957.

44. Shaffer, Robert N.: Alpha irradiation, Am. J. Ophth., 37:183-196 (Feb.) 1954.

45. Stallard, H. B.: Pathological study of retinoblastoma treated by radon seeds and radium disks, Brit. J. Ophth., 36:245-254 (May) 1952.

46. ———: Pathological study of retinoblastoma treated by radon seeds and radium disks, A.M.A. Arch. Ophth., 51:573-588 (May) 1954.

47. Stetson, Charles G., and Schulz, Milford D.: Carcinoma of the eyelid, New England J. Med., 241:725-732 (Nov.) 1949.

48. Straatsma, Bradley R.: Meibomian gland tumors, A.M.A. Arch. Ophth., 56:71-93 (July) 1956.

49. Tamler, Edward; Winter, Frank C., and Toch, Paul: Radiation effect on intraocular tissues and radon seed treatment of retinoblastoma, A.M.A. Arch. Ophth., 58: 647-654 (Nov.) 1957.

50. Tanew, N.: The ingrowth of epithelium in the anterior chamber of the eye and roentgen treatment, Klin. Med., 2:512-537 (Nov.) 1947.

51. Theobald, Georgiana D., and Haas, Joseph S.: Epithelial invasion of the anterior chamber following cataract extraction, Tr. Am. Acad. Ophth., 52:470-485 (May-June) 1948.

52. Traub, Eugene F.: Diagnosis and treatment of carcinoma of the eyelids, J.A.M.A., 154:9-12 (Jan. 2) 1954.

53. Vail, Derrick: Treatment of cysts of the iris with diathermy coagulation, Tr. Am. Ophth. Soc., 51:371-383, 1953.

54. von Sallmann, Ludwig: Experimental studies on early lens changes after roentgen irradiation. III. Effect of x-radiation on mitotic activity and nuclear fragmentation of lens epithelium in normal and cysteine-treated rabbits, A.M.A. Arch. Ophth., 47:305-320 (March) 1952.

55. ———: Some experimental ocular lesions resulting from ionizing radiation, Tr. Am. Acad. Ophth., in press.

56. von Sallmann, Ludwig; Caravaggio, Leo; Munoz, C. M., and Drungis, A.: Species differences in the radiosensitivity of the lens, Am. J. Ophth., 43:693-704 (May) 1957.

57. von Sallmann, L.; Munoz, C. M., and Drungis, A.: The effects of beta radiation on the rabbit lens, A.M.A. Arch. Ophth., 50:727-736 (Dec.) 1953.

58. von Sallmann, Ludwig, et al.: Effects of high-energy particles, x-rays, and aging on lens epithelium, A.M.A. Arch. Ophth., 54:489-514 (Oct.) 1955.

DISCUSSION

DR. COGAN: This is quite informal and unrehearsed. I have picked one question from the top of the deck, so to speak.

Would you discuss a latent period in the time between exposure and the development of cataracts as a function of dosage?

DR. COGAN: Latent period is, of course, an inverse function of dosage. At threshold levels of 600 to 1000 roentgens, the latent period is a matter of several years. At higher levels the latent period is progressively less. At 3000 roentgens, the latent period is a matter of several months only.

I have another question I would like to answer that is pertinent to this last one.

Describe the latent period of ray cataract. What causes the latent period?

DR. COGAN: My guess is that the latent period is that time between the damage to the epithelial cells and their ultimate differentiation at the equator. It seems most likely that cataracts are actually caused by the abortive differentiation of the epithelial cells into lens fibers. We actually have little information on the migration of the epithelial cells to the equator normally, but this must take considerable time and may well account for the extraordinarily long latent period in the development of the radiation cataracts.

Should the radiologist treat all patients with beta radiation?

DR. SCHULZ: It depends a little bit upon your philosophy. I believe that no one has a corner on ability. Who treats whom with what depends entirely upon a person's experience and his opportunity to learn what can be done and what cannot be done.

It is like saying, "Should an ophthalmologist treat all patients with sties?" Certainly a great many plaques are in the hands of ophthalmologists, and if they know the limitations of the instruments and the area of their usefulness, there is no reason why they should not use them.

DR. HUGHES: Is it easier to teach the radiologist the use of the slit lamp than to teach the effects of radiation on the external eye to the ophthalmologist?

DR. SCHULZ: Well, then, you might say, "It is easier to teach the English language than the use of the telephone."

DR. EVANS: I would like to say in this connection that I worry a little bit about ophthalmologists using a strong beta source, unless they get some radiology consultation, work with a physicist, or get some training for it. It is not entirely innocuous, you know; and one could expose himself unnecessarily to beta and to some more penetrating x-ray like radiation from metal in the source beam.

So I would say that if the ophthalmologist is going to use it, he should realize that it is ionizing radiation, and should get some training in it.

DR. SCHULZ: I agree. Any medical procedure requires a little bit of basic understanding and training.

DR. COGAN: We might ask Dr. Evans what he means by contact with some metallic material in the use of beta radiation.

DR. EVANS: Energetic beta particles or electrons can eject electromagnetic radiation, and, from certain metals, this can be rather penetrating. One can detect a more penetrating radiation coming from a beta source in its metal shield. The intensity is not very high, but it is something to be aware of and helps to explain why lighter but thicker shields of plastic are used to protect the hand of the user.

DR. COGAN: If, for instance, one had a speculum in the eye and the radiation came in contact with that, would that be a source of x-ray?

DR. EVANS: Theoretically, it would be; but my guess is that it would be thick enough to absorb the radiation produced in the metal. The speculum would also scatter the beta radiation to some extent.

DR. SCHULZ: The amount of radiation produced under such a circumstance is minimal anyway.

DR. EVANS: It is minimal as compared to the amount of beta dose given, but from a protection standpoint, it should be known that the exposure intensity at the surface of the storage box may be 50 milliroentgens per hour, due to the more penetrating radiation produced.

Should ophthalmologists give radiotherapy?

DR. WILSON: I think Dr. Schulz has already answered quite well a similar question, and I agree with him on this point. Ideally, ocular radiotherapy should be a matter of teamwork between the ophthalmologist and the radiologist, but I question the wisdom of inforcing such an arrangement in all instances. Rather, it should be a matter of individual decision for any given locality, depending on the experience and interest of the individuals involved and the local ground rules.

Is there any danger to the doctor treating patients with the strontium applicator?

DR. WILSON: This again involves the question of Bremsstrahlung, which exposes the operator to whole-body radiation, in addition to the obvious necessity for avoiding undue exposure of the hands locally.

I do not know of any other figures on the quantity of Bremsstrahlung from the strontium applicator, but in 1949 Dr. Robley Evans measured the photon activity of the radium-D applicator, and he found this to be of the same order that would come from 0.007 mg. of radium, which is sufficiently low for clinical purposes to consider the radium-D applicator a pure beta emitter.

It is true that the energies of the beta particles from strontium are considerably greater than those from radium-D, but it is questionable whether even this would result in enough photon activity to be of serious consequence to the doctor treating the patient.

What is the time element between beta therapy and keratoplasty? How soon should surgery follow radiation? How soon should radiation follow surgery?

DR. WILSON: Preoperative use of beta radiation in keratoplasty, regardless of the time interval, has resulted in interference with wound healing in about half of the cases, so I think it should be avoided whenever possible.

How soon, then, should radiation follow surgery? As soon as the indication for beta radiation is found? This will usually consist of vascularization, either growing into the graft or threatening the graft. The earlier the new vessels are treated, the more sensitive they will be found to be, and the lower the dosage necessary.

DR. HUGHES: For example, what dose would you use if you found, after three weeks, capillaries growing into the graft?

DR. WILSON: In the more mature types of vascularization of the cornea—as, for example, in our cases of rosacea keratitis—we found that about 6000 rep was necessary to eliminate the corneal blood vessels in any given area. In treating more immature vessels, which are more radiosensitive, this dosage can be reduced considerably.

I think we should fractionate the dosage over a period of three to four weeks, starting out with something on the order of 1000 rep and repeating it at weekly intervals or twice a week.

DR. HUGHES: You mentioned wound healing. I have always been bothered a little about the effect of x-ray therapy on plastic surgery, including skin grafts. I believe there was a question to that effect, Dr. Schulz.

DR. SCHULZ: After radiotherapy it is always more difficult to get grafts to take and wounds to heal when the irradiated tissues remain. It has been the common practice, then, to remove all irradiated tissue before proceeding with any reconstructive surgery.

This does not always have to be done, of course. There are times when you need not. But then comes the question: What happens to a graft if it is heavily irradiated? Sometimes you get away with it; oftentimes you lose the graft.

These grafts do not show the same pigmentation, or the same erythema that the normal skin shows; and then, two or three weeks after completion of the course of irradiation—something in the order of 3000 rad in a single sitting or four or five thousand roentgens in four weeks' time—the graft sometimes dies.

By and large, I think you could say that if you attempt to preserve the radiated tissues, radiation and reconstructive surgery do not mix very well. You get away with it once in a while—that's all.

What is the current status in x-ray treatment to the posterior segment of the eye for a diabetic retinopathy?

DR. HUGHES: In 1947, Guyton and Reese reported on a preliminary series of Eales' disease and diabetic retinitis proliferans. The follow-up on those cases was given in the *Survey of Ophthalmology* this year (1958) in discussion of an article by Anjou and Cederquist, who treated such cases with smaller doses than used previously, namely 5000 rad. They found that there was no difference in the results when the eyes were treated with radiation and when they were not.

In discussion, Drs. Reese and Guyton agreed that the use of large doses of radiation (10,000 to 15,000 r in air) for diabetic retinopathy or Eales' disease is completely contraindicated. Although the large doses will eliminate the outgrowth of capillaries into the vitreous, the late vascular changes make the condition worse. Guyton commented that in the patients treated with low doses (3500 to 4000 r in air), there was no effect of the radiation on the course of Eales' disease.

Is radiation ever indicated for hemorrhagic glaucoma associated with rubeosis iridis in a blind and painful eye? If so, describe the method of treatment. In what percentage of cases has enucleation been avoided?

DR. FORREST: I was carrying out some of the therapy which Reese and his associates were doing in the early days, and the doses would now be considered fairly high. Our radiation was directed against changes in the retina before glaucoma and rubeosis iridis with complications. We would have considered hemorrhagic glaucoma, of course, a failure. We have not had occasion to treat hemorrhagic glaucoma ourselves with radiation, so we have had no success in avoiding enucleation. Certainly there are a few reports in the literature, but we have not had any personal experience with it.

DR. HUGHES: We have had a few cases in which both radiation and cyclodiathermy were used on rubeosis of the iris and hemorrhagic glaucoma; and the tension has become normal. Also the vessels themselves have shown some shrinkage.

What is the course of retinoblastoma residual in the orbit?

DR. FORREST: We have examined patients who were labeled as having residual disease by virtue of the finding of cells outside the enucleated eye. This occurred with unilateral retinoblastoma in eleven of our twenty-three cases. It occurred in the first eye in eight of those twenty-three patients, in the second eye in three, and both eyes were involved in two. Of this group there were nine survivors. Seven have survived from four to twenty years; two have survived from eleven to seventeen months, and the rest all died. All the survivors had radiation, and we feel that radiation has resulted in some of those survivals.

What is the ophthalmoscopic appearance of retinoblastoma during treatment?

DR. FORREST: We have slides prepared just for such a question as this, and I would like to show them to you.

[Slide] This is the appearance of the lesion before treatment—white, globular, vascular.

[Slide] This shows the minor changes within a matter of two or three weeks after radiation.

[Slide] This shows the tremendous change that takes place at about the fourth week.

[Slide] This shows the initial tumor.

[Slide] This shows that sometimes the tumor shrinks and almost entirely disappears. You can see the marks due to the presence of residual calcium.

[Slide]Occasionally even that seems to disappear almost completely. The use of TEM and the smaller x-ray doses seem to leave us with patients who survive with considerably better vision than in the early days when the higher doses without TEM were used. Following the high doses we had a significant number of survivors in whom vision was poor or in whom the eye was lost. TEM as an adjunct has helped not only in the survival but in improving the vision.

Intravenous radioactive phosphorus is often given as an aid in diagnosing intraocular malignancy. Do you think the total body radiation from a dose of 750 microcuries is dangerous in the average adult? Could this dose be safely repeated several months later?

DR. EVANS: When you consider that the dose indicated here is 750 microcuries, almost one millicurie, and that we give from 1 to 4 or 5 millicuries to treat polycythemia vera, you are in the range that is effective in hyperplastic conditions. I do not believe one can say that a dose at this level is safe in the sense of not doing any damage at all.

I think it is a clinical question of how much damage you are willing to give to the bone marrow, and so on, in order to get this diagnostic aid which you need, which may be important enough in your judgment to justify using it.

Usually there is a radioisotope committee which helps to share this responsibility.

You wouldn't hesitate to do it if you felt it was doing enough good, of course; and you would not hesitate to repeat it in several months again if you thought it was indicated. But, because of the hysteria surrounding radioactive materials and so on, I think the responsibility is at present greater than it would be in the case of a conventional x-ray exposure. Therefore, I would suggest that it is a clinical problem, an individual problem, one that you probably should share with the radiologist, or at least someone from the Radioisotope Committee.

In view of the high incidence of lens opacity with radon and strontium 90, *would the radium-D applicator be preferred?*

DR. WILSON: The beta particles from the radium-D applicator are relatively weak, averaging, as was pointed out by Dr. Cogan, 0.34 MEV, and approximately 90 per cent of this radiation is absorbed in the first millimeter of the tissue.

Of course, that means that there is very little danger to the lens, but by the same token, and for the same reason, its use is limited to very superficial—even surface—lesions. That it can be used as a substitute for the more energetic beta applicator is possible, I would say, in some cases but not in others.

In addition to this, now that we have fairly well established the threshold doses for opacities in the lens due to beta radiation with these various applicators, in the future we can either accept a sector opacity as a calculated risk or we can avoid it entirely by the proper regulation of dosage.

In these cases, of course, it would not be necessary to substitute the radium-D applicator for the strontium applicator.

Is there any diagnostic appearance of a cataract due to radiation from an atomic bomb?

DR. COGAN: The cataracts in the atomic bomb survivors were exactly like those resulting from x-rays or any other form of ionizing radiation. Initially they consisted of posterior central opacities, in line with the posterior capsule. They were unaccompanied at first by evident changes in the equatorial regions. Presumably the damaged equatorial cells migrate to the posterior pole and undergo an abortive form of differentiation there.

Dr. Cogan, did you state that radar will produce cataracts in humans only in lethal doses? If so, why all the precautions to vision in radar workers?

DR. COGAN: Many of the precautions with radar are currently based on the fact that we do not know, or have not known, just what the hazards are. Some of us believe the precautions are overly conservative. To be sure, cataracts may be produced by exposure of the head region to microwaves, but we have found under field conditions that cataracts are not produced in sublethal dosages when, as would almost invariably be the case, the whole body is exposed. Moreover, the heat effect is sufficient warning in any dangerous level of exposure, so the hazards are quite different from those of ionizing radiation.

On the other hand, there may be some incidental exposure to ionizing radiation associated with the apparatus at the source of the microwaves (not out in the field) and this is a potential liability. However, I am told that this is well recognized and adequate shielding has been built into the apparatus.

THE CORRECTION OF NASAL SKELETAL DEFECTS

EDGAR M. HOLMES, M.D.

BOSTON, MASSACHUSETTS

IN discussing the correction of nasal skeletal defects, those which are purely variations of normal growth and are the result of racial or familial characteristics will be excluded from the discussion. Congenital deformities which alter the nasal skeletal framework will also be omitted, as they fall into another category.

The fundamental principles and procedures that are employed in the purely cosmetic rhinoplasty are basic and well understood by all plastic surgeons. Each surgeon has his own particular modification to accomplish a certain goal. In the literature, there continues to appear new modifications, new techniques and ways of solving specific conditions. Frequently, the usefulness of these new techniques and the principles which are involved are questionable.

I will limit myself to deformities of the nasal bones, septum, ala and lateral cartilages which are usually the result of trauma sometime during life, resulting in deflection, depression, or even loss of substance. Through the medium of slides, some of the problems that arise because of the deviated septum will first be presented together with methods for their correction which have been found practical.

From the Department of Plastic Surgery of the Massachusetts Eye and Ear Infirmary.

Presented at the *Special Program* of the Committee on Reconstructive Plastic Surgery: Otolaryngology at the Sixty-Third Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 12-17, 1958, Chicago.

SEPTUMS

Before discussing the correction of septal deviations which result in a depression of the nasal dorsum and a pulling in of the columella, I would like to point out why this occurs. In figure 1, which is a diagram of the component parts of the septum, we have two fixed points, A and B. A, being the tip of the nasal bones and B, the tip of the premaxillary spine. The quadrilateral cartilage of the septum is in contact and fixed from these two points inward. The part anterior to line 2 represents that portion outside of the skull. When the tip of the nose is hit violently, it will invariably deflect to one side or the other and, in most cases, the cartilage has sufficient spring so that it will not break. If it should break, it breaks along a line corresponding to line 2. This is one of the common nasal deflections which we encounter in surgery; usually associated with it is a deviation of the entire nasal dorsum below the tip of the nasal bone.

If the blow is from above so that the distance between the cartilaginous dorsum and the vomer ridge is decreased, the cartilage has a tendency to become dislocated from the vomer groove and displaced to one side or the other. This may be with, or without, a fracture of the cartilage. Whichever it is, the cartilaginous dorsum is depressed because of lack of support. If the patient is seen at the time of injury, it is possible to lift the cartilaginous septum into position, where it may be splinted until it heals. This same principle holds true when we have fractures of the nasal bones along with those of the septum.

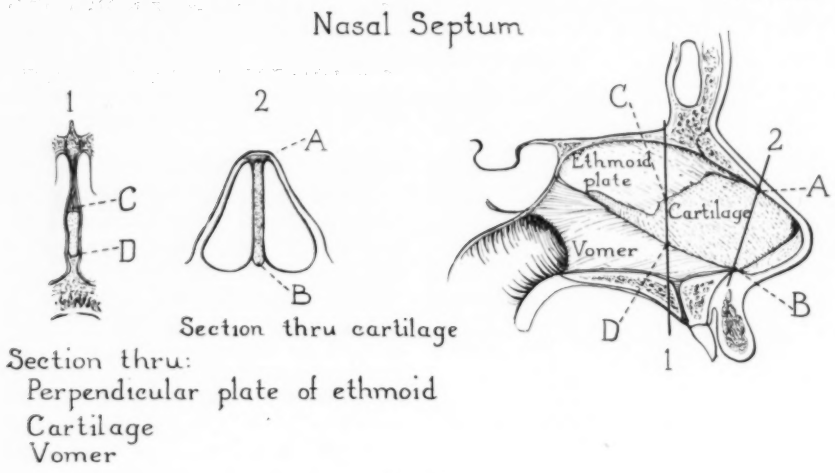


FIGURE 1

In a case that is very comminuted, the components will invariably be found broken, twisted or duplicated, as well as displaced from the vomer groove. After reduction of the nasal bones, if attention is paid to the reduction of the septum and its immobilization, the nasal bones will maintain their position without resorting to complicated splinting.

Figure 2 represents diagrammatically a normal septum. This diagram will be altered to illustrate the various septal defects and methods of their correction will be discussed. Figure 3 illustrates a septum which has had a blow to the nasal tip dislocating the quadrilateral cartilage from the vomer ridge and fracturing it from the tip of the nasal bones perpendicular to the dorsum. The dotted line A-B represents the perpendicular section which is shown to the right, C. In this view, observe that the dorsum would be depressed the distance between the vomer groove and the displaced lower border of the septal cartilage. On top of the vomer groove is a pad of fibrous tissue which in some cases will be as thick as three to four millimeters.

In correcting most deviated septums I have found that an incision on the convex side at the mucocutaneous junction is the most convenient approach. If the deviated septum is associated with a nasal deformity which will require a rhinoplasty as well, the approach to the septum is through the transfixion incision.

The membrane is dissected from the entire convex side of the deviation. If there is a marked angulation along the

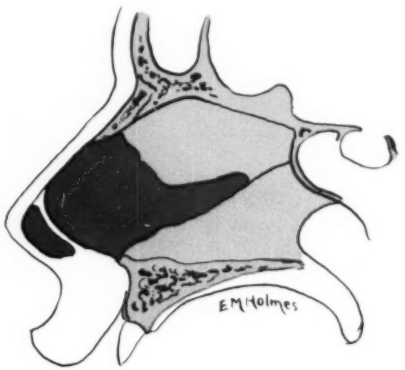


FIGURE 2.

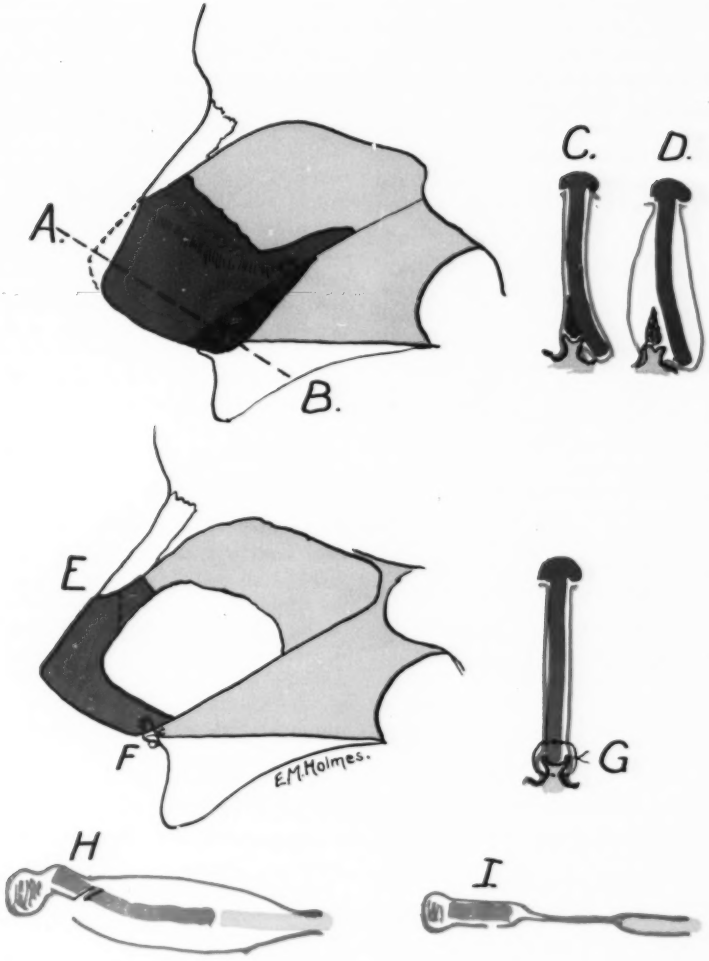


FIGURE 3.

vomer ridge where the membrane is very thin and difficult to separate without tearing, one need not be disturbed if it is torn because it is always safest to leave a good sized incision in one flap to avoid a possible hematoma. An incision is next made through the cartilage with the blade held at an angle of about 45 degrees to its surface and parallel to the first membrane incision. It is usually easy to separate the membrane on the concave side without any danger of tearing it.

It is advisable to leave the membrane in contact on one side of the cartilage which is to be left in place, and this is easy to do on the concave side. All the deflected, obstructed cartilage and bone may then be removed, but it is not necessary to remove all the perpendicular plate of the ethmoid or all of the vomer if it is not obstructing. It has been my experience, however, that the majority of cases that justify a submucous resection of the septum require a nearly complete removal of the component parts before adequate alignment can be made.

We now have left the anterior and dorsal cartilaginous septum, E and F. To replace the dislocated base of the cartilage, it first must be freed by separating it from its bed. The pad of fibrous tissue which fills in the vomer groove must first be cut out (C and D). The membrane is first cut away from the pad of fibrous tissue under direct vision; then the pad is easily separated from the cartilage. This gives us three to four millimeters more room on the preoperative concave side so that it will not become obstructed when the cartilage is repositioned in the midline. If this tissue can be freed from the vomer groove readily by blunt dissection, very well; if not, sharp dissection is the best alternative.

Once we have a complete freeing of the dislocated cartilage and a new bed on which it may be placed, it is elevated and sutured in place by a mattress suture going through the entire septum then back beneath the premaxillary spine (F and G). Before sewing this in place, it is necessary to break any angulation beneath the tip of the nasal bones. This may be readily done by making a cut through the cartilage beneath the tip of the nasal bones where the membrane is still in contact on one side of the cartilage. Care is taken not to cut the membrane, as it acts as a splint to hold the mobilized distal cartilage in place. The cut through the cartilage should be perpendicular to its surface and yet form a 45 degree angle to the dorsum. This permits the cartilage to hinge at the tip of the nasal bones, while the shelving projection which is left supports the distal cartilage and prevents it from slipping into the nose, which would result in a depression of the dorsum below the nasal bones.

The method of performing a submucous resection of the septum in which there is an angulation or dislocation of the cartilage which creates a depression of the dorsal tip is basic for all septums. A strip of cartilage is left beneath the dorsum, which continues down in back of the columella to the premaxillary spine. All the rest of the septum may be removed if it is obstructing. The strip that is saved is freed and straightened so that it comes to the midline, where it is sutured and immobilized until healed.

In figure 4, there is a buckling of the septum between the tip of the nasal bones and the premaxillary spine, as well as a dislocation from the vomer groove. This has created a displacement of the free border of the septum so that it presents in the nasal vestibule, A. In addition to the operative procedure which was described in the first case, it was necessary to break the spring at the angulation, expose the free border of the

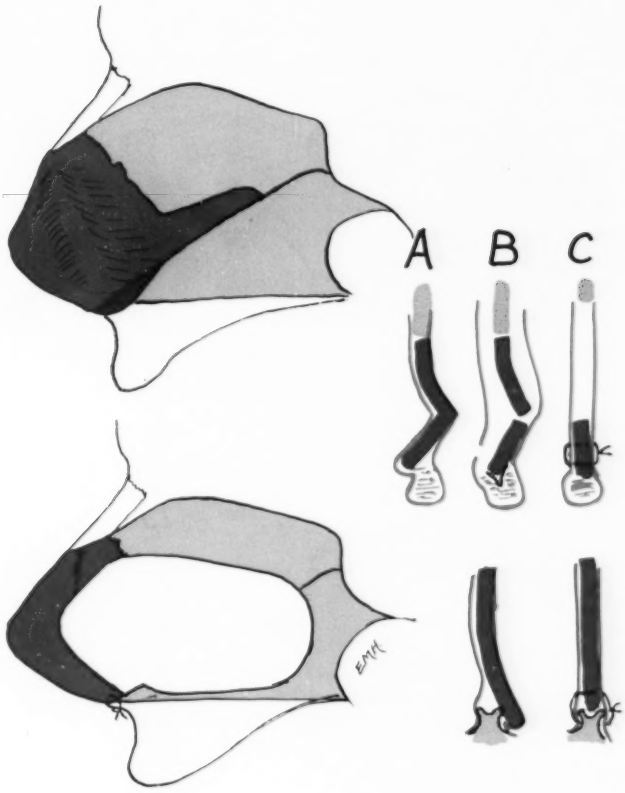


FIGURE 4.

cartilage and replace it behind the columella where it was sutured in place (B and C).

Figure 5, A and B, represents an angulation of the cartilage in a plane parallel to the vomer ridge. Here, again, the same principles are employed in correcting the deviated and displaced cartilage. The obstructed, deviated cartilage and bone are removed. The cartilage which must be saved is straightened by removing a trough of cartilage parallel to the bend on its convex side, so that when straightened, there will be a square butt without further tendency to angulate. The membrane is not disturbed on the concave side of the remaining cartilage. The cartilage displaced from the vomer groove is freed and replaced, the angulation is corrected at the tip of the nasal bones and then the remaining mobilized cartilage is sutured in place (C and D).

Not infrequently in treating a fracture we find a duplication of the cartilage (fig. 6). In a case such as this, great care must be taken in separating

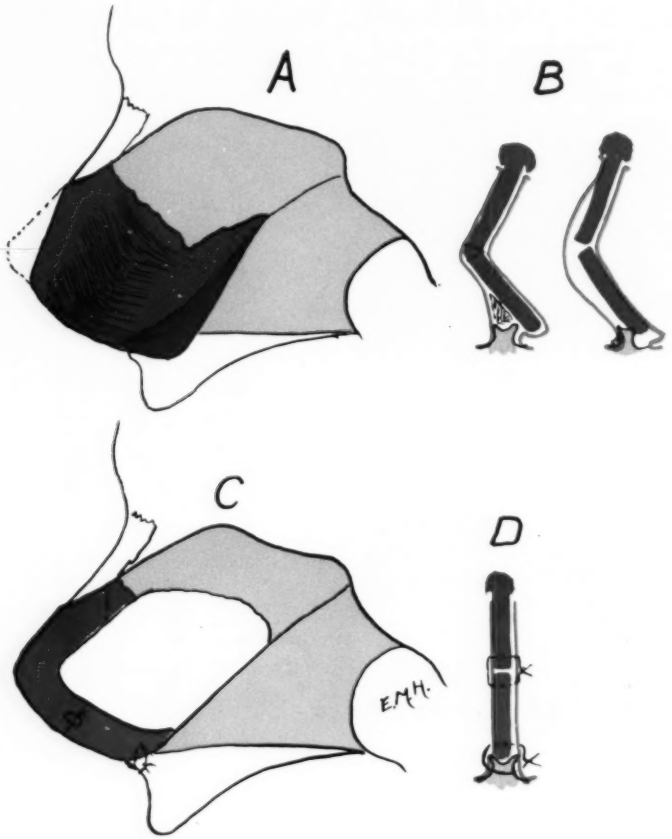


FIGURE 5.

the membrane from the cartilage and then the cartilages from one another. It is disastrous to dissect hurriedly in such a case and create other cuts which would jeopardize the rigidity of the remaining cartilage, which we need for support. The two fragments are freed. The broken ends usually have to be cut clean so that they will rest upon one another and not slide. They are then sutured to hold them in position.

Another type of septal fracture is vertically placed, and the free border is pushed backward and displaced from the vomer groove as well (fig. 7). In these injuries, there is not only a lowering of the tip but a pulling in of the columella which accentuates the nasolabial angle. This gives the illusion of a drooped tip. All this is cared for when a resection of the septum is performed and the displaced cartilage is restored to its position

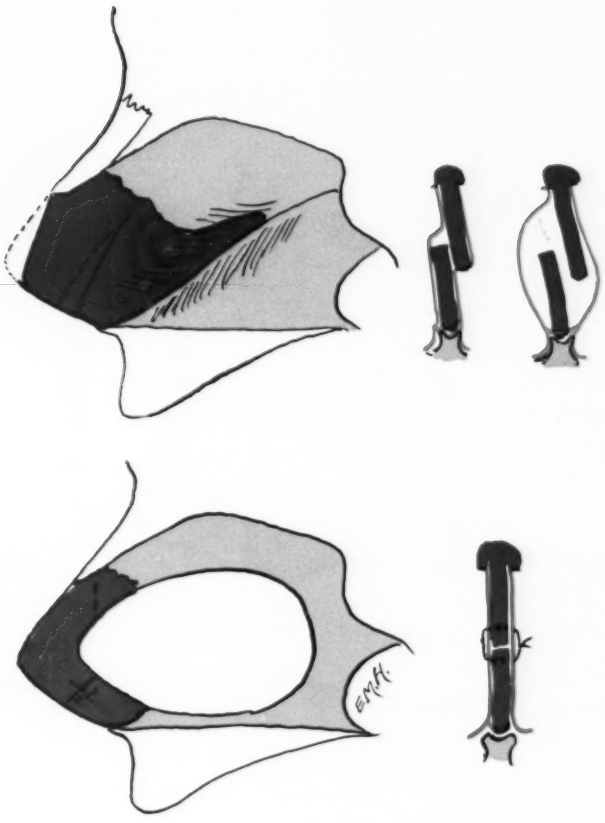


FIGURE 6.

in the vomer groove. Care must be exercised in placing the stay suture to be certain that the cartilage is brought forward into its proper position (C).

So far, cartilage which has been primarily angulated or displaced has been considered. Not infrequently, we will encounter cartilage which is markedly curved not only in one plane but in two planes, so that we find it difficult to free up and realign in the midplane the strip which we normally save for support (fig. 8). If an attempt is made to realign the cartilage *in situ* in such a case, it is done as diagrammed in B. When one examines these patients and finds that there is cartilage behind the deviation, which is fairly flat, one can remove most of the septum, including that which should be saved for support. The flatter part is then shaped, reinserted and sutured to support the dorsum and the columella (fig. 8, C and D). This free grafting should be done as a last resort, for

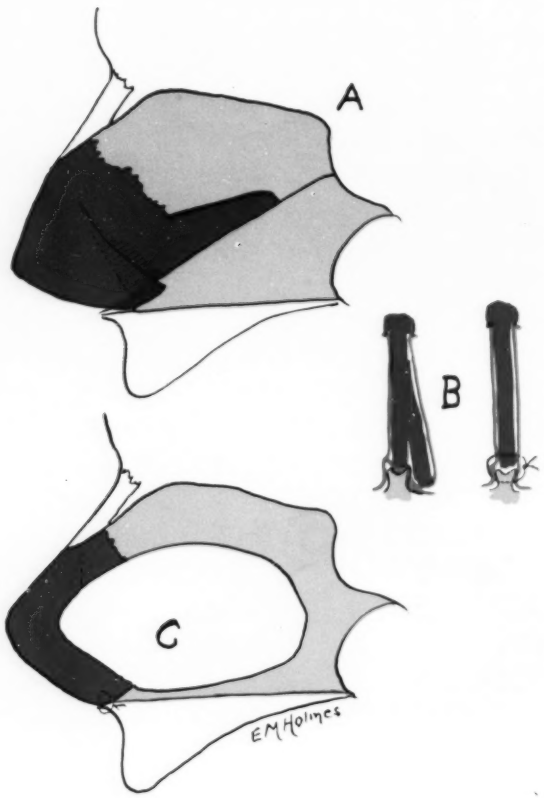


FIGURE 7.

a free graft will occasionally be absorbed even though it is of autogenous septal cartilage. In certain cases, it is possible to utilize some of the vomer or even the perpendicular plate of the ethmoid for support. The drawback to the bony implants is that they are rigid and very easily fractured.

Case 1 demonstrates how several procedures must be employed to correct a distorted nasal support and how an illusion of a depressed tip may be corrected by removing a hump and elevating the tip. There is a deflection of the entire nose to the right, including the tip of the nasal bones. The alar cartilages have become asymmetrical because of long-standing deflection, the lateral cartilages are misshaped, and there is slight drooping of the tip, as indicated in the profile (fig. 9, A). To correct such a deformity, a rhinoplasty should be performed first.

Figure 10, C, is a diagram of the exposed skeleton in this case. Observe the displaced tips of the nasal bones and the asymmetry of the cartilaginous tip. The hump was first re-

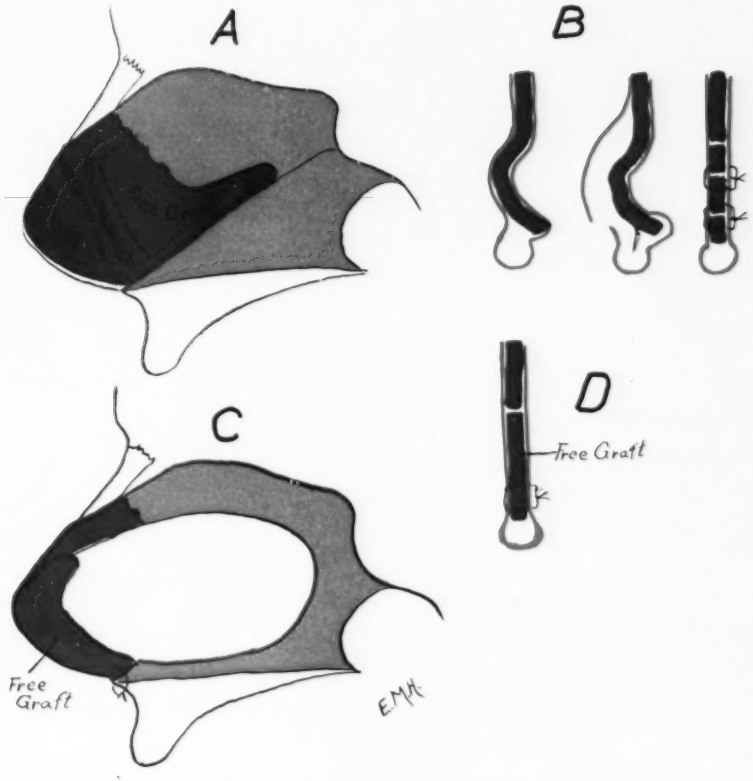


FIGURE 8.

moved (fig. 10, D). This removal obliterated the broken and displaced nasal bones but demonstrates very well the angulation of the lateral cartilages as they join the nasal bones and ascending processes. Whenever this condition is encountered, it is imperative that this junction where the lateral cartilages join the nasal bones and ascending process be freed by actual separation. When this is not done, it may result in the tip being deflected after it has been brought to the midline even though the septum has been straightened.

A good criterion for determining whether all necessary spring has been broken is whether the nose will stay in position by itself once its component parts have been realigned. If it does not, there is cartilage somewhere which should have its spring broken. In this case the left side of the septal cartilage had a marked "S" curve and a cone-like cartilage in front, which we would ordinarily save for supporting the tip (fig. 10, E). It is fortunate that this may be removed. By so doing, we eliminate this badly curved septum and

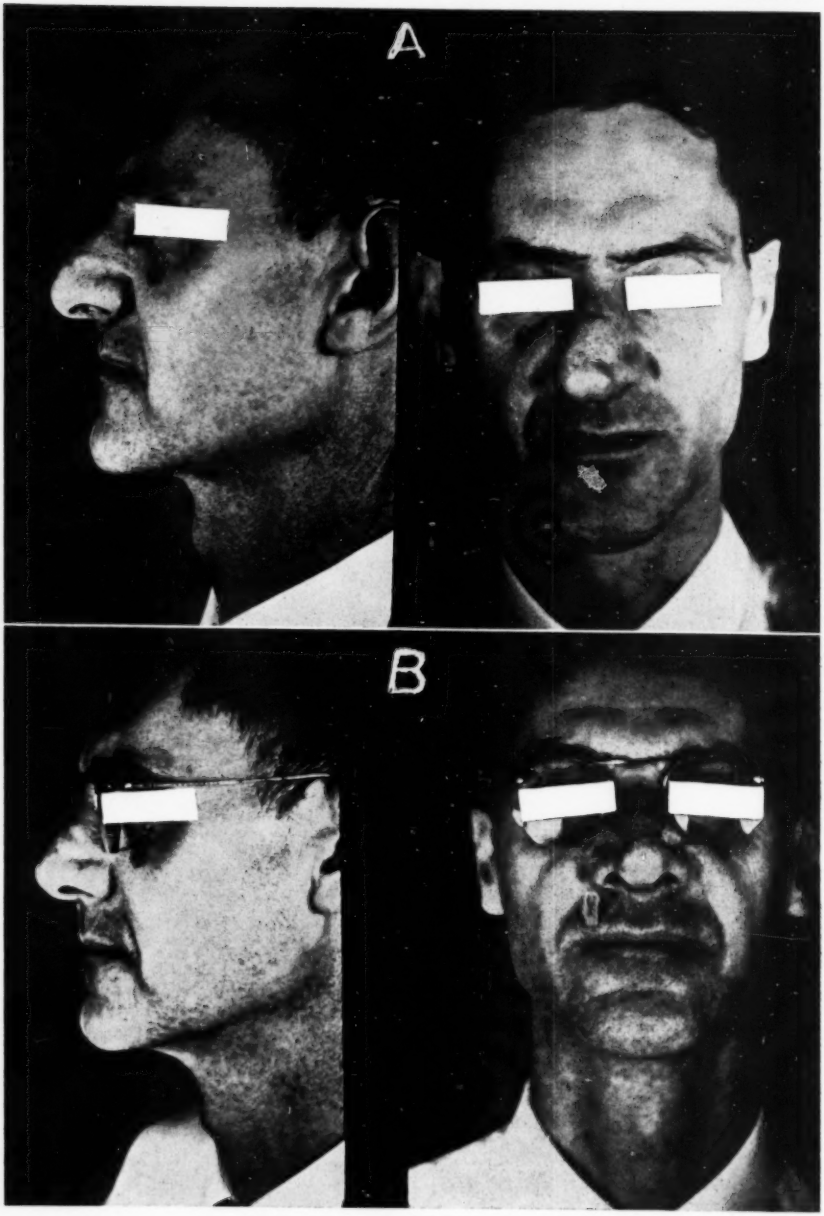


FIGURE 9.

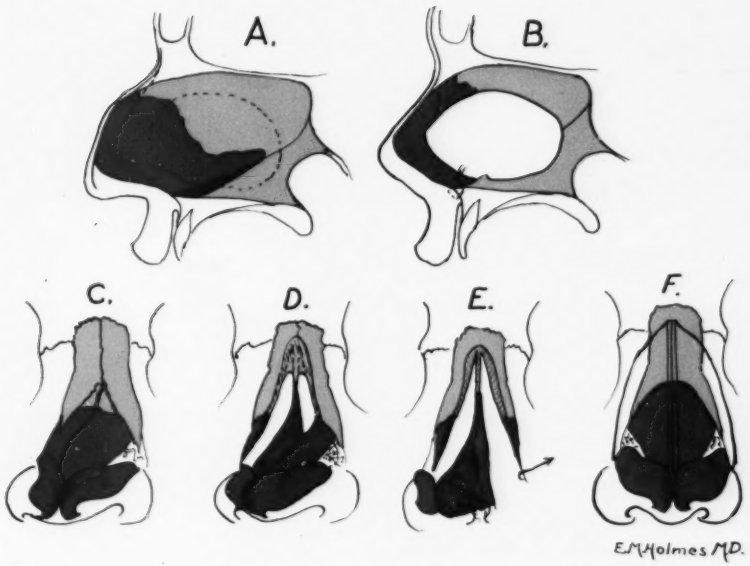


FIGURE 10.

shorten the nasal dorsum. The ascending processes were then scored with a saw, the base of the nasal bones scored with an osteotome, and a wedge of bone removed, permitting the lateral wall to be brought into proper alignment (fig. 10, F). The alar cartilages were adjusted to overcome their marked asymmetry. A submucous resection was performed, as previously prescribed. The anterior cartilage which was displaced from the vomer groove was placed into position and the septal cartilage was straightened by correcting the bend at the tip of the nasal bones. Figure 10, B, shows the amount of hump and septum which was removed and that which was retrained. The postoperative result is shown in figure 9, B.

So far, only septal defects and their correction have been discussed. Some of these defects involve support to the nasal dorsum, and it has been demonstrated how the support can be corrected by operating on the septum alone. We also encounter cases in which this is impossible, as loss of cartilage and bone, either through trauma or disease, requires that support be added to return the contour to one that is normal or, shall we say, acceptable. Whenever there is a defect, whether it be structural support or skin covering, it is always advantageous to employ local tissue which may be either swung or utilized as a free graft. I will now demonstrate several methods in which the lateral wings of ala cartilages may be employed alone or in conjunction with septal cartilage to serve this purpose.

DEPRESSION OF CARTILAGE DORSUM

One of our cases was that of a girl who had lost dorsal support due to excessive removal of her septum (fig. 11, A). Observe that she has fairly thick,

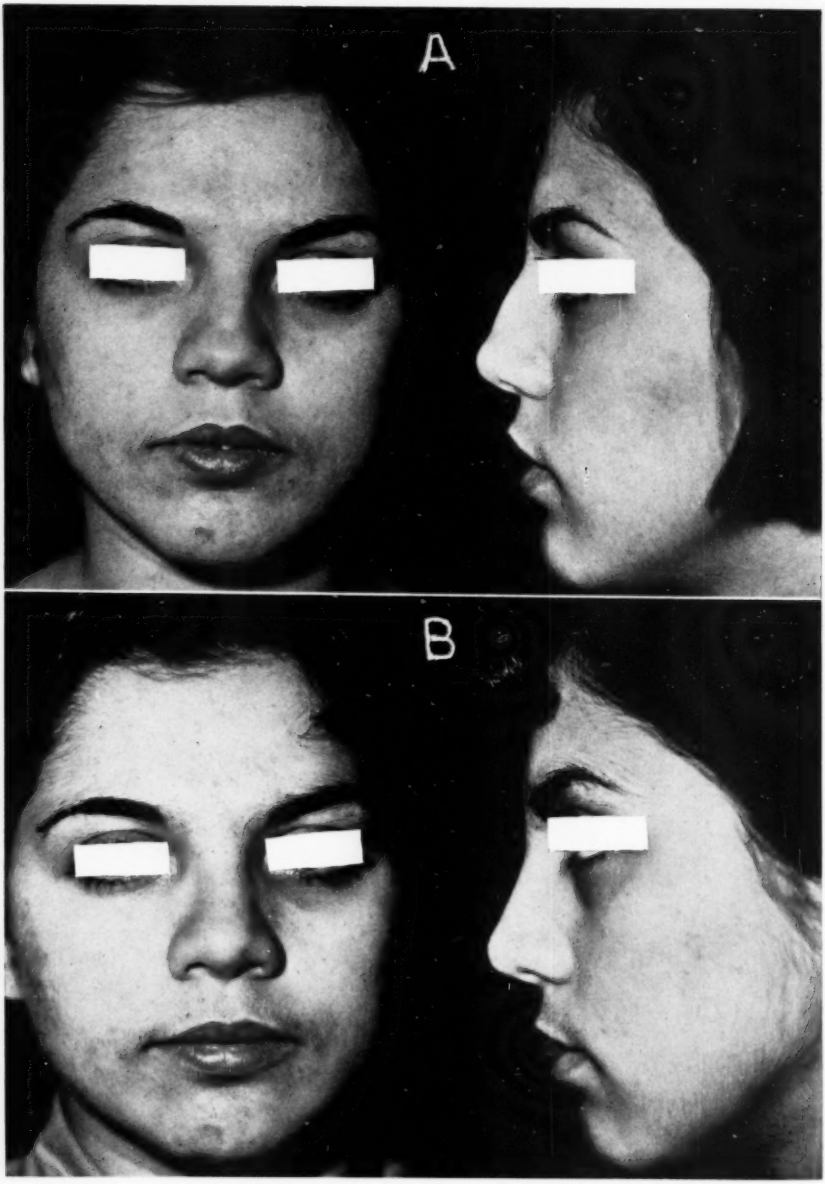


FIGURE 11.

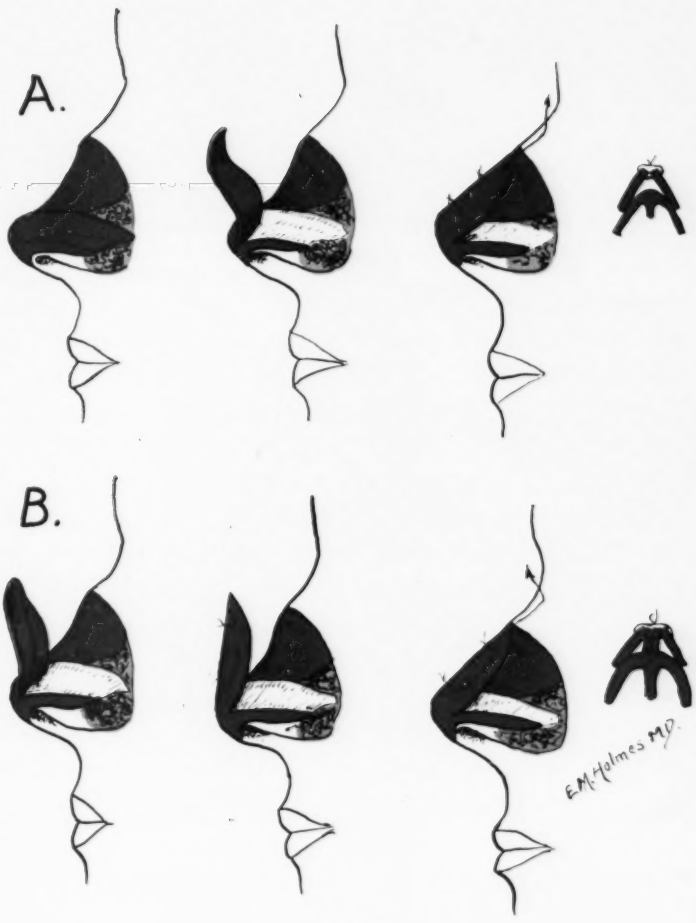


FIGURE 12.

well developed lateral wings to her ala cartilages. There is a moderate depression of the dorsum below the tip of the nasal bones and a retraction of the columella, creating an acute nasolabial angle. There was nothing within the patient's nose which would permit one to restore normal support. In a case like this, the simple "ala swing" is a very excellent procedure. Figure 12, A, demonstrates how this is performed. A vestibular incision is made from the vestibular apex laterally to the lateral extension of the alar cartilage and parallel and about an eighth to three-sixteenth of an inch from the free border of the cartilage. From the apex, a transfixion incision is made and the lateral cartilages and nasal

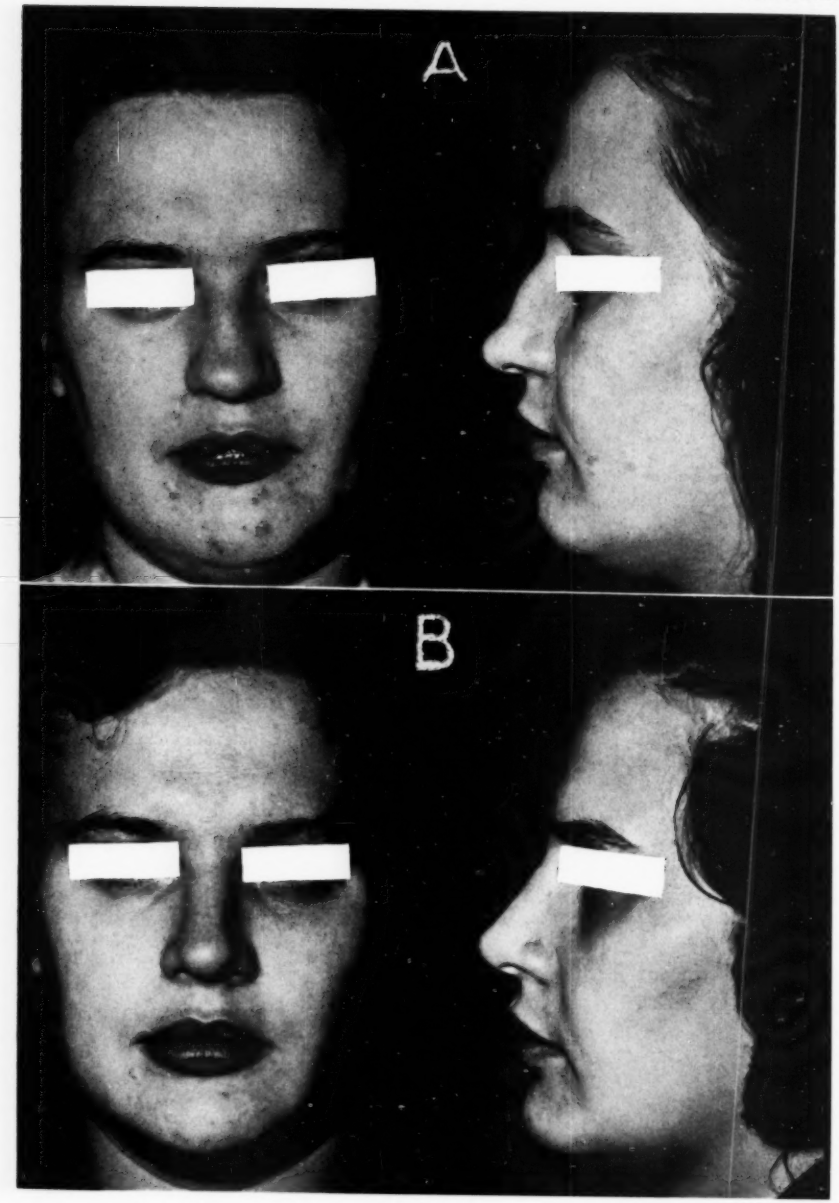


FIGURE 13.

bones are exposed as for a rhinoplasty. The entire lateral wing of the alar cartilage is then freed so that it may be swung up and sutured to one or the other side at the dorsum. The two are then held in the midline by a stay suture which comes from the cartilage up through the dorsal skin. Figure 11, B, shows the postoperative result. Observe that the dorsum has been straightened, the nasolabial angle improved, and the entire tip narrowed.

Figure 13, A, demonstrates a more marked depression and drooping of the tip in a similar case of lost septal support. Here again, there is ample alar cartilage with which to reconstruct the lost support but it is necessary not only to do the customary ala swing but to fold the alae upon themselves before suturing them to the midline so that we have added bulk for support (fig. 12, B). The alar cartilages are freed as described in the previous case. Each is then scored on its dorsal aspect from the apex toward the lateral end so that it will fold along this cut. They are then sutured as illustrated. The diagram at the right is a cross-section of the cartilage and demonstrates how added bulk has been gained. Observe that the profile has been corrected, the nasolabial angle improved and the bulbous tip narrowed (fig. 13, B).

A similar condition existed in another case but examination of the patient revealed that the alar cartilages were not well developed (fig. 14, A), and it seemed advisable to utilize pieces of the septal cartilage which could be sutured together, shaped and inserted as a free graft (fig. 15, A). In employing this technique, the criterion of success is to have the cartilage which comes directly beneath the skin smooth and well shaped. Support beneath it and the depressed septum and alar cartilages can be irregular, but it is imperative to fill in the entire area so that the skin will not be pulled in around the graft, developing an irregularity at a later date.

A man fractured his septum and had such extreme scarring that an implant above the dorsal skeleton was necessary (fig. 16, A). An ala swing was performed and it was found that the columella was still quite retracted. A pocket was, therefore, made between the medial crura of the alae down to the premaxillary spine into which a cartilage implant was placed (fig. 17). Postoperative results using this technique are shown in figure 16, B.

The last case in this series of depressed cartilaginous tips was complicated by a depression of the nasal bones, but it is included because a similar technique was employed to correct it (fig. 18, A). The lateral wings of the alar cartilage, being well developed, were freed, folded, and then sutured together in the midline. The patient's nose had been badly injured in childhood so that the septum was buckled and duplicated. It was very difficult to obtain large pieces of cartilage, but it was possible to obtain sufficient cartilage so that two pieces could be sutured together, then shaped and placed beneath the ala swing (fig. 19). This created a pleasant tip but then there was a void between it and the glabella. Another free piece of cartilage was then shaped and inserted in that area. The easy way to correct this type of nose would have been to insert a bone graft, but utilization of local cartilage creates a nose which feels more normal and one which will not break if hit. Figure 18, B shows the postoperative result.

In all of the cases so far, only viable autogenous local cartilage has been used for skeletal support. It has been my experience that nearly all cases of this type

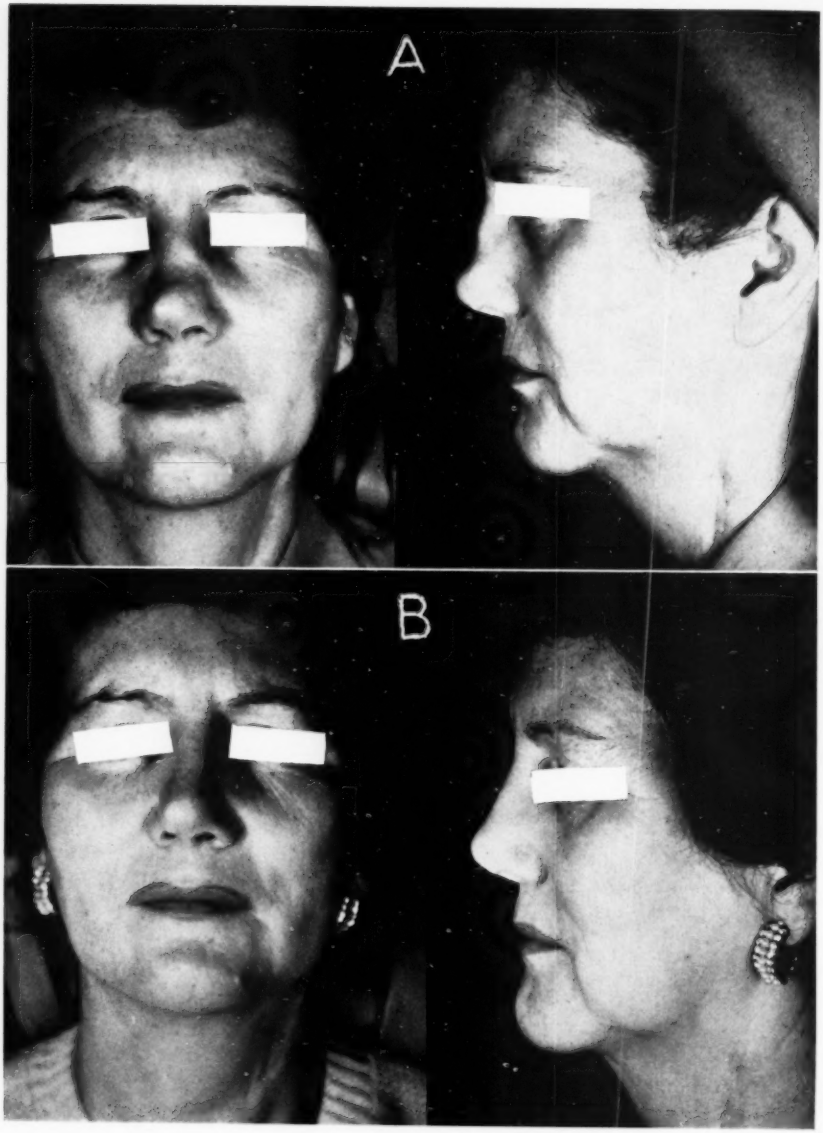


FIGURE 14.

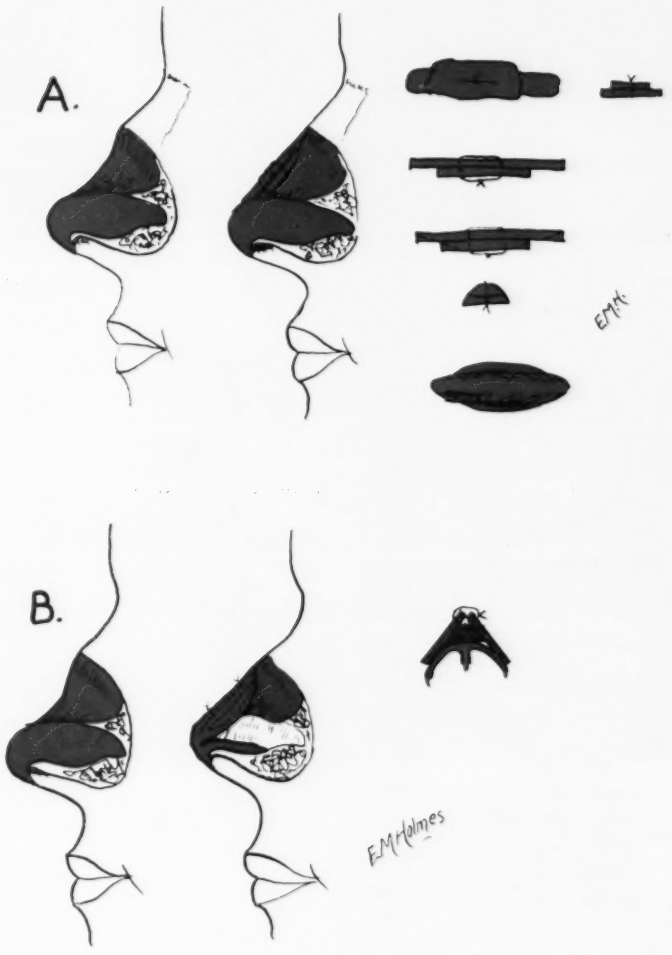


FIGURE 15.

can be corrected in this manner. It is unnecessary to employ foreign implant materials which may set up a foreign body reaction and have to be removed or may themselves be absorbed.

When these procedures are inadequate due to lack of bulk, it then becomes necessary to use some other material which may replace the lost skeletal support. This need for more bulk than can be obtained locally necessitates that some material must be found that will be tolerated by the tissues when buried. Before discussing these materials, I would

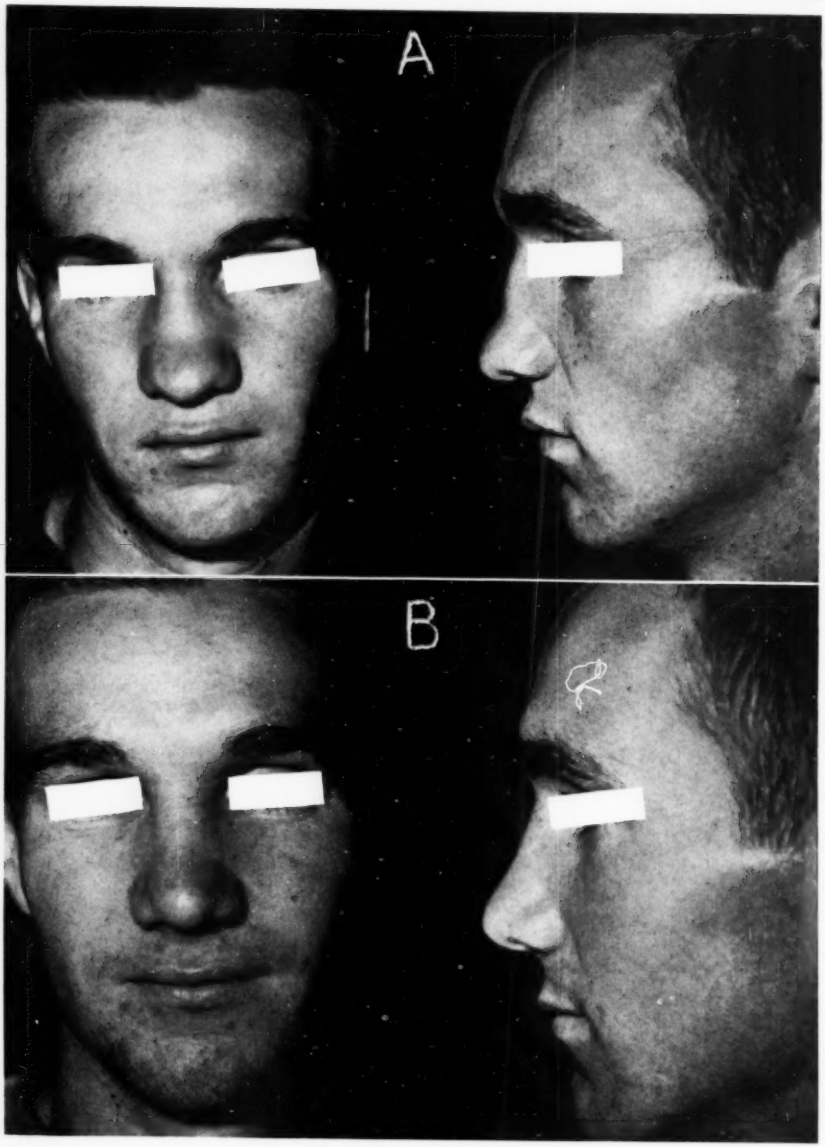


FIGURE 16.

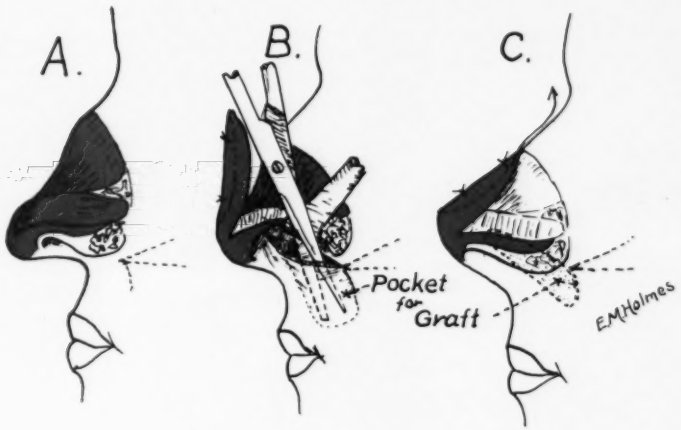


FIGURE 17.

like to mention a few historical facts about tissue transplantation. In the early literature recorded by the Egyptians, tissue grafting is mentioned as far back as 3500 B.C. This consisted of flap and skin grafting operations, all of which were widely practiced through the centuries. The techniques were slow in spreading to other countries, but, in time, they were employed in India, Asia, Arabia, Persia, Greece and other countries.

After the fall of the Roman Empire, at the beginning of the Christian Era, the Dark Ages followed, during which most of all art, literature and science disappeared. It was not until the fifteenth and sixteenth centuries that the science of tissue transplanting, utilizing skin flaps, was reborn. This gradually became more and more popular until the nineteenth century, when use of skin flaps was a commonplace practice throughout Europe. It was not until asepsis was fully understood and anesthesia perfected that surgery as a whole gained impetus and many of the procedures that are used today were perfected. In the twentieth century, World Wars I and II increased the need for plastic surgery, particularly the free grafting of skin and the use of solid skeletal supports. In this discussion, we are dealing primarily with skeletal supports. Many materials have been used to supplement inadequate supply of bone and cartilage in the restoration of a nasal framework, and a word is in order concerning these substances.

The materials fall into two main groups. Those which are inorganic, such as gold, silver, tantalum, vitallium and the plastics, and the organic ones, which include ivory, cartilage, bone, fibrin, fascia and others. Some of the earliest implants to replace lost bone were the basic metals, such as gold and silver. Some of these were satisfactorily tolerated but the percentage of foreign body reaction was so high that the use of these materials was discontinued. In recent years, tantalum,[4] which is a completely inert, basic metal and experimentally showed no foreign body reaction when buried in tissues, stimulated investigation as to its worth in surgical procedures. Later, the alloys,[8] vitallium and stainless steel were

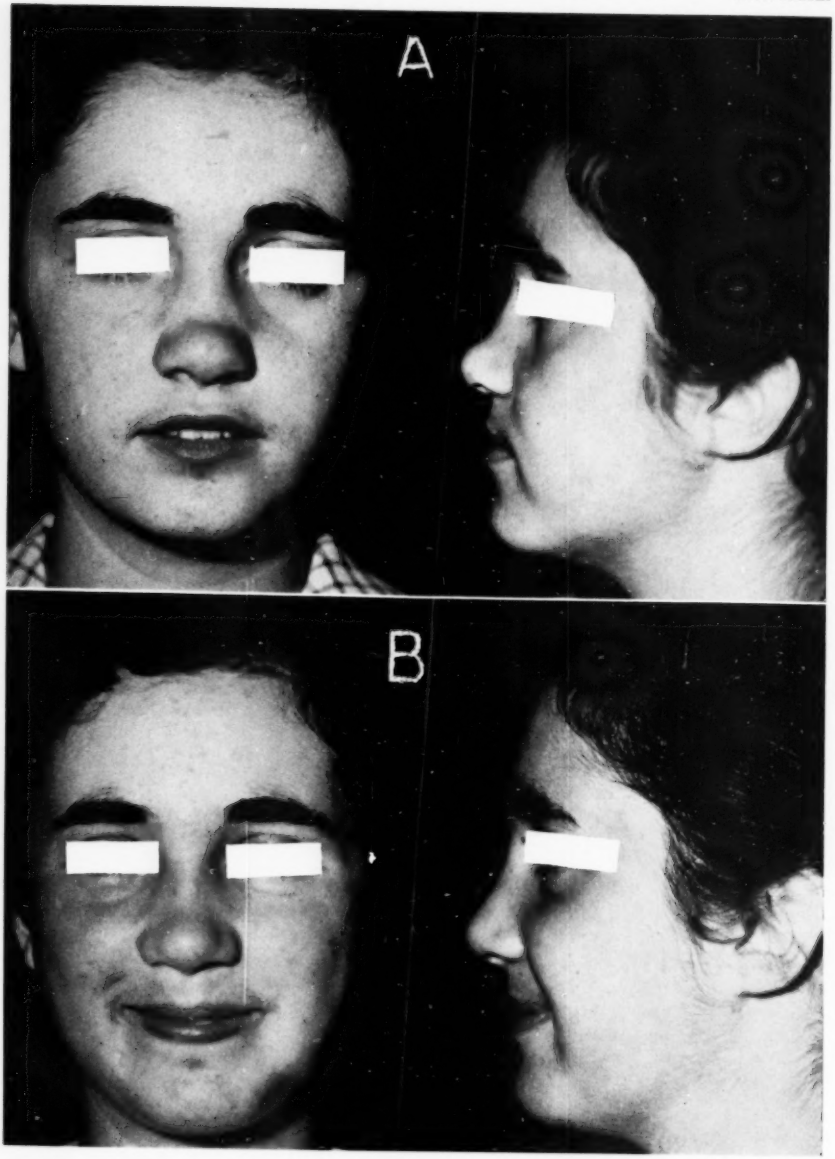


FIGURE 18.

FIGURE 19.

introduced, and all three of these metals today have their accepted position in surgery as materials which may be employed either to reinforce bone until it heals and becomes solid or to replace bone. The latter is of particular value when there is a loss of the cranial vault. These materials when used in their solid form and buried beneath the skin may be tolerated, but unless they can be anchored to the tissues by having multiple perforations in them so that fibrous tissue may grow through and immobilize them or by screwing them in place, they have a tendency to migrate. If they hold the skin up in any one area, such as is the case of a dorsal implant in the nose, the constant, light pressure of the metal beneath the skin creates a very slow, avascularization and pressure necrosis which, in turn, brings the metal to the surface; when this happens, it must be removed. When tantalum was first introduced in sheet form, I tried it in three noses. In two of them, the tantalum had to be removed. In the third one, the implant was constructed and inserted so that the alar cartilages were between the metal and the skin directly over it; it has been retained. Tantalum[4] has been tried in the form of a wool. When this could be inserted beneath the skin without any free cut ends, it was accepted and incorporated by fibrous tissues which retained it without reaction. If the mesh or tantalum wool was cut so that there were free ends of wire, these free ends would frequently find their way to the surface, requiring removal. If the other end of the wire was long and entangled in the wool mesh, it was frequently found necessary to remove all the mesh. The metals are, therefore, a poor material for the reconstruction of the dorsum of the nose.

Ivory[10] is a product of living tissue which must be considered a solid material. This has been used for years as an implant; only a few years ago I encountered a case in which it had been retained for twenty-five years without any apparent foreign body reaction until a slight blow to the tip of the nose caused one,

requiring its removal. This was quite an ideal material, for it could be tooled to any shape desired not only prior to, but at, the operation. Today, it is rarely employed. About the same time that the inert metals were introduced, chemical companies produced several plastics, some of which, such as the acrylic resins,[9] polyethylene,[5] tefion and others, were found experimentally to be well tolerated by body tissues. Some of these are ideal implant materials for they are very much like cartilage in their texture and flexibility. These in a solid form are sometimes well retained, but like the metals, a fair number of them were either not shaped correctly or were improperly inserted so that they set up a reaction and appeared through the membranes or skin of the nose and had to be removed.

A polyethylene sponge[6] of fine texture has been found experimentally to be encapsulated and incorporated into the tissues by the ingrowth of fibroblasts without evidence of foreign body reaction. The material is similar to cartilage in that it is flexible and can be readily tooled with a sharp knife at the operating table. The fact that it will not curl or change shape makes it more ideal than cartilage as an insert. By invasion of fibroblasts which immobilize it in the tissues, it will not migrate, so the problem of fixation except for the first few days is a simple one. Many operators are using this for most of their patients who require an insert in the nose, and there have been few reported failures. It appears to be a fairly good substitute for autogenous cartilage and bone.

While we are discussing synthetic or chemical compounds, a word about paraffin should be mentioned. It seems unbelievable that anyone would be tempted to use this material today when it is well known what happens when it is injected. When first introduced to the profession, it appeared to be an ideal material for filling in a defect beneath the skin. It could be injected while melted and molded to a desired shape before it hardened. It has several drawbacks. The major one and the one which condemns it, is the foreign body reaction which it produces. Many of us here today have seen patients with a disfiguring paraffinoma. Some or these are most difficult to eradicate completely and when the implant has been removed, a graft must be inserted to restore the nasal contour. If a synthetic material could be found which could be injected in a liquid state, molded, and then allowed to harden in this form and which at the same time would be inert, we would have a material which would find wide use in supporting skeletal defects of the nose, face and ears. Of course it should be at least as soft and pliable as cartilage to be fully acceptable. Some type of plastic which will gel slowly after a catalyst is added may some day be developed; this will solve this problem.

Let us consider some of the organic materials which may be used for nasal implants. Autogenous cartilage[7] transplanted into a vascular field will usually be incorporated as living cartilage. When removed at a later date, it has all the appearance of normal, living cartilage. If, on the other hand, this same cartilage should be buried in a scarred or avascular area, it may die—being infiltrated and replaced by fibroblasts which, in turn, may greatly diminish in size so that for practical purposes the mass may disappear completely. It has been my experience in some of my ear reconstructions that this is more prone to happen in the young child than in the adult.

A further word about autogenous cartilage. Large blocks of rib cartilage, which give all the cartilage we ever need for use in a nose, have the big disadvantage of curling after they have been cut. Even though the central part

of a block is used, we may still have later curling. Boiling the cartilage and preparation in other ways have not solved this big problem, which is not only annoying to the surgeon but disastrous to his reconstructive work. To overcome this most discouraging and annoying tendency of cartilage to curl, the ingenious method of cutting the cartilage into very small pieces, or "dicing" it, and inserting it beneath the tissue until sufficient bulk was obtained was tried. This at first appeared to be quite an ideal technique. It was not only used for the reconstruction of the nasal framework but also for filling in defects of the forehead, cheek, mandible, and even for the reconstruction of an auricular cartilage. The latter method for reproducing skeletal support for the reconstruction of the ear was most ingenious and stimulated a great deal of enthusiasm for it. It was found that diced cartilage was satisfactory if there was a thick skin beneath which it could be buried. If the skin was thin, it was observed that there was considerable irregularity due to the small pieces of cartilage showing through; so, on the whole, this is not quite as good a method as some of the others. Septal cartilage and auricular cartilage very rarely cause curling, and if we are able to secure a sufficient amount from the septum, three or more pieces may be sutured together to create bulk, and then may be shaped. This gives the surgeon an ideal material and method for the replacement of lost dorsal support.

In an attempt to obtain an ideal material which could be had in large amounts and could be maintained in a bank, homologous[12] and bovine[3] cartilages were introduced. These have been used extensively and have their advocates. Some of the cases in which these foreign cartilages have been employed are apparently successful in that the implant is incorporated and retained indefinitely as a foreign body. There are many of these implants, however, that are replaced by fibrous tissue invasion; so many, in fact, that I discarded bank cartilage several years ago. Many implants of heterogenous cartilage are apparently well tolerated up to one year postoperatively, but if these cases are followed two, three or more years, many of the results will be found discouraging.

While we are discussing organic materials, we would be remiss if blood fractions were not mentioned. Fibrin foam and thrombin have been mixed with bone chips and used as a medium for filling defects.[11] The authors of this technique claimed that this formed a matrix which was incorporated in the tissues, and some cases undoubtedly were successful. There are cases that must have had absorption of much of the bone as bone not in contact with living bone will be absorbed.

There is a report of having used fibrin for elevating small depressions of the skin.[12] I have observed the result in a case of old, scarred acne. The result was quite gratifying. If this material could be used for filling large defects, it would help us in many cases. It deserves further investigation.

It is well recognized that autogenous bone buried in contact with bone and surrounded by good blood supply will become incorporated as living bone.[1,2] Attainment of this result is not quite as simple as it sounds. The grafted bone first dies; osteoclasts next invade its structure, destroying its framework; while at the same time, osteoblasts start laying down new bone so that by the time the process of destruction is completed, the entire bone has been replaced by a living structure firmly adherent to the recipient bone by a callous. It has also been observed that homologous bone which is

dead when it is buried in the host goes through the same process of absorption and regeneration. The grafted bone merely acts as a framework through which the new bone is laid down. Bone, therefore, becomes an ideal medium for repairing large defects of the nasal skeleton. Autogenous bone may be obtained from several sources. Some operators prefer the tibia, which is accessible and already has a surface which needs little changing to form a desirable implant. Occasionally, the removal of a graft weakens the tibia so that precaution must be taken against fracturing it. The rib and scapula have also been employed, but the source which is considered the best by most surgeons is the crest of the ilium. Here large quantities of cortical and medullary bone may be obtained without affecting function and the resulting scar may be covered by clothing.

It has been a matter for discussion whether cortical or medullary bone is the better of the two for nasal implants. It is generally conceded today that myelogenous bone may be received and become an integral part in the host quicker, while cortical bone will maintain a better shape and, even though the time element of incorporation may be longer, the structural end results are usually better. In bone grafts, whether a strut is employed to maintain an elevation of the tip or not, it is found by roentgenography that the bone assumes a new architectural structure. We may see a cortex to correspond to the contour of the nose and the stresses which are placed upon it. The opponents of the use of autogenous bone as a nasal implant maintain that plastics, bank cartilage or bone do just as well and that they avert the need for another operation. These claims are partially just; yet, when a solid graft is indicated, autogenous bone gives us the best results. The additional operative procedure which the opponents dislike is really minor, as it takes little time to expose the ilium and obtain the graft. While an assistant is closing the wound, the surgeon may be sculpturing the insert; thus, little added time is actually necessary. What we should strive for is an implant which is completely tolerated by its recipient host, ignoring all other factors. Autogenous bone fulfills this end more than other materials and is preferred as an implant when a large skeletal defect of the nose is to be corrected. The patient shown in figure 18 has a nose with defective dorsal support which involves the nasal bones and cartilages. It has already been shown how this can be corrected by using the alar cartilage supplemented by a cartilage implant taken from the septum. If the alar cartilages were small or if there were not enough bulk obtainable from the septum, one would have to resort to a graft or implant (fig. 20). As has already been mentioned, there are several materials which may be employed as an implant. Regardless of the implant employed, the principles used in inserting all of them are the same.

There are several incisions through which the dorsum of the nose may be approached to prepare it for the reception of the graft. Incision through the skin of the nasal tip or columella creates a direct view of the dorsum which is ideal surgically, yet it may be difficult to obtain an opening of sufficient size to permit the passage of a large graft, which may be necessary in some cases. In addition to this, it leaves a visible scar. In order to overcome these objections, I have found the following approach more satisfactory.

An anterior incision is made through the vestibular skin parallel to and one-eighth of an inch from the margin of the lateral wing of the alar cartilages. When the medial crura are reached, the incision is directed back to their posterior

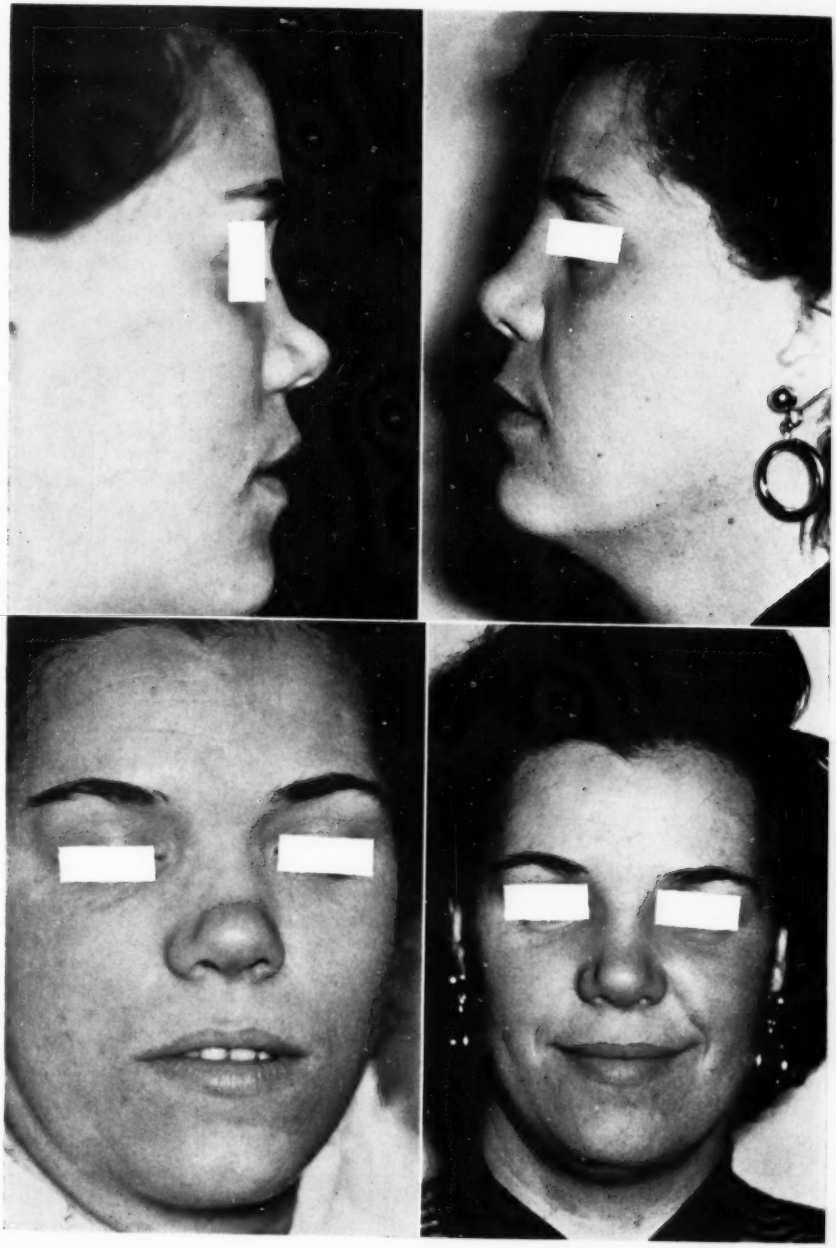


FIGURE 20.

border and carried through and through as a transfixion incision (fig. 21, A). The vestibular skin is then dissected free from the lateral crura of the alar cartilage up to the lateral cartilages themselves, which are then exposed up to the nasal bones. An incision is then made parallel to the pyriform aperture through the periosteum, which is next elevated from the nasal bones up to the glabella (fig. 22). The median raffe must usually be cut to permit elevation of the periosteum in the midline but in its upper third in the region of the glabella, it is always possible to create a pocket which is to receive the upper end of the graft (fig. 22, B and D). The nasal periosteum is then elevated laterally down over the ascending processes to permit the skin to form a lateral side of the nose which appears to be normal. The medial crura of the alar cartilages are freed from one another by employing blunt dissection. This step is important for the medial crura are sutured over the graft at its tip and will be dealt with later (fig. 21, C; fig. 22, B and D). If it is apparent that the columella should be brought forward, it is advisable at this stage to continue the dissection of the medial crura of the alar cartilages down through the soft tissues to the region of the premaxillary spine. In this pocket, a graft may be placed. It may also be advisable to make a pocket in the free border of the septum. The nose is now ready for the reception of the graft.

The crest of the ilium is next exposed. Using a thin, broad osteatome, the cortex is sculptured *in situ* to form the exact contour desired to form the dorsal support. It is very easy to tool in this position as it is completely immobile. Once the dorsum and the bone which will correspond to the lateral sides of the nose and even lost ascending processes are sculptured, they are removed as a block, taking a good margin of bone in all directions. If there is a possibility that we may wish to use bone to fill out the columella, it may be taken at this time. All bleeding is then controlled and the wound closed.

Once removed from the ilium, the bone is tooled with a rongeur and rasps, or a motor-driven burr if one wishes, so that the finished product will completely fill the defect into which it is to

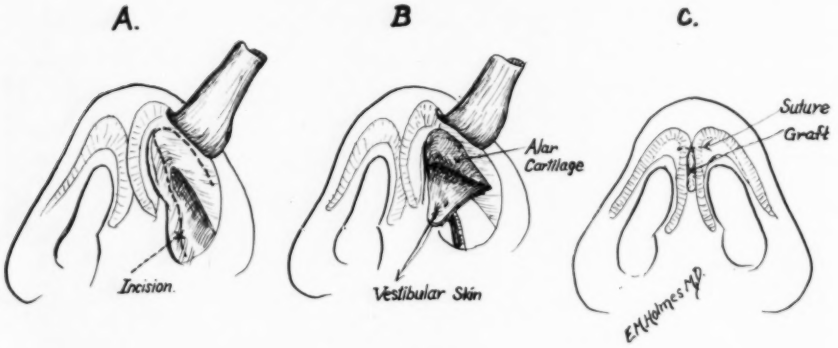


FIGURE 21.

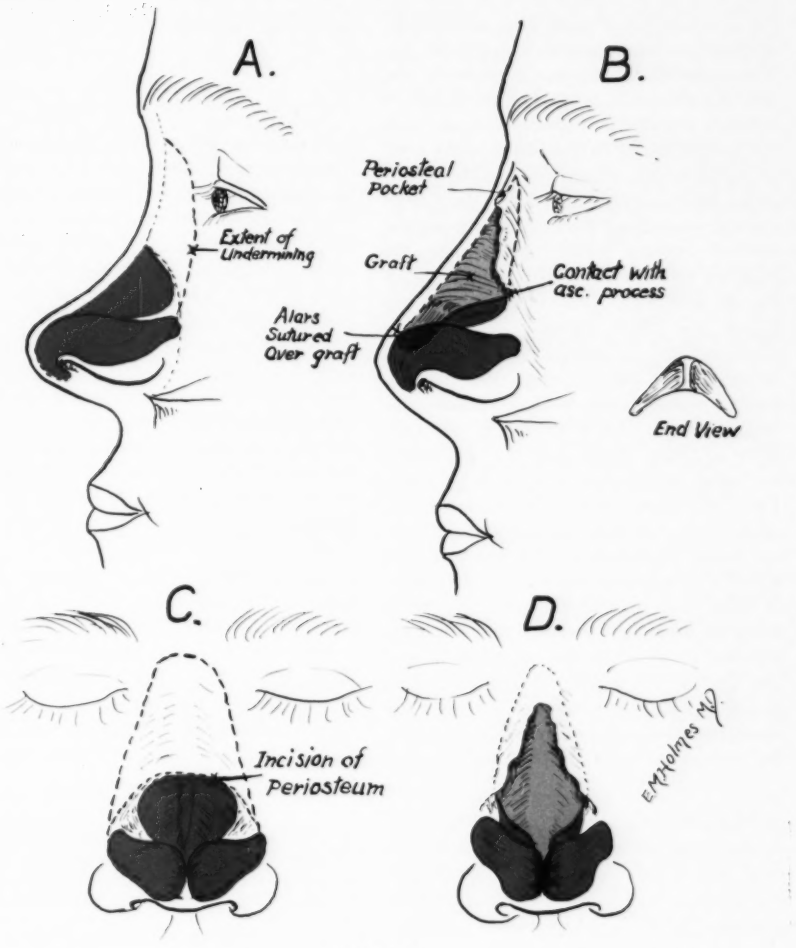


FIGURE 22.

be inserted. If any groove or space is left between the graft and ascending processes, it will cause an external depression in that area when the skin is pulled in as healing progresses. If we are unable to tool the graft exactly, bone chips or cancellous bone may be used to fill in these small areas but, when possible, we like to have the graft fill in the entire defect by itself. This can best be visualized by referring to the diagram (fig. 22). The solid upper half of the graft is carved so that it will rest securely upon the nasal bones. Great care is taken so that its upper end will insert into the pocket at the glabella, which should hold it firmly in contact with the bone. The lateral wings of the graft will

then rest either upon the nasal bones or the ascending processes and, in turn, by its cantilever action will support the tip. This procedure makes unnecessary the use of a columella strut. The graft is then tapered gradually from its contact with the lower border of the nasal bones until it comes to the region of the alar cartilages. Here it is thinned from the lateral aspect, permitting it to come between the medial crura, which may then be sutured on top of it for support (fig. 22, B and D). This elevates the tip above the graft, giving the profile a more normal appearance. The original incisions are now closed, the nose is packed intranasally, and a routine external pressure bandage is applied. This type of bone graft has the advantage of being in contact with a larger surface of living bone. It is immobile, takes well, becomes an integral part of the nasal framework, and supports the tip of the nose in a more normal anatomic relationship without resorting to a strut of bone between the anterior premaxillary spine and the undersurface of the tip of the graft. If the columella needs to be more prominent, a piece of bone may be inserted for that purpose but not to act as a support for the tip.

This method of bone grafting is illustrated in figure 20. The patient in this case had a loss of dorsal support following injury as a child. The nasal bones and the lateral cartilages were both depressed. Because of loss of support to the alar cartilages, the tip, too, had drooped slightly. There was no lateral displacement of the bone or cartilage. At operation, the procedure described above was employed. In the postoperative pictures, it will be noted that there is maintained a slight elevation of the alar cartilage on top of the graft and that there is no indentation along the lateral wall of the nose between the graft and the ascending processes of the superior maxilla. All visible scars are eliminated by the vestibular incision.

SUMMARY

A discussion of the correction of various degrees of lost skeletal support has been presented. Methods to correct minor defects which will employ local tissues in preference to those using grafts from distant parts or foreign body implants are given. When lost dorsal support is the result of a buckled or displaced septum, it can frequently be corrected by replacing the displaced cartilaginous septum. If this is impractical and there is a good development of the alar cartilages these may be used as local flaps to elevate the dorsum and, at the same time, to narrow a bulbous tip. If, in addition to the lowering of the cartilaginous framework, there is a depression of the nasal bones, an alar swing associated with a cartilage graft from the septum may give sufficient material for correction. In large defects, it becomes necesary to borrow an implant. Iliac bone is the best material for this purpose. The various defects and their methods of correction are illustrated by photographs and drawings.

REFERENCES

1. Cannon, Bradford, and Murray, Joseph E.: Plastic surgery: tissue and organ homotransplantation, New England J. Med., 255:900-904 (Nov.) 1956.

2. Cottle, Maurice H.; Loring, Roland M.; Cohen, Maurice H., and Kirschman, Robert: Cancellous bone grafts in nasal repair, Ann. Otol., Rhin. & Laryng., 58: 135-146 (March) 1949.

3. Cottle, Maurice H.; Quilty, Thomas J., and Buckingham, Richard A.: Nasal implants in children and in adults; with preliminary note on the use of ox cartilage, Ann. Otol., Rhin. & Laryng., 62:169-175 (March) 1953.

4. Fox, Samuel L.: Tantalum in rhinoplastic surgery, Ann. Otol., Rhin. & Laryng., 58: 40-54 (March) 1949.

5. Heanley, C. L.: Restoration of nasal contour, with a note on use of polythene block, J. Laryng. & Otol., 68:112-113 (Feb.) 1954.

6. Johnson, Hugh A., and Grindlay, John H.: Experimental alteration of nasal contour by the use of polyvinyl sponge, Plast. & Reconstruct. Surg., 14:293-297 (Oct.) 1954.

7. Peer, Lyndon A.: Fate of autogenous septal cartilage after transplantation in human tissues, Arch. Otolaryng., 34:696-709, 1941.

8. Pressman, Joel J.: Nasal implants, Laryngoscope, 62:582-600 (Aug.) 1952.

9. Salinger, Samuel: Ivory implants; survival after twenty-three years, A.M.A. Arch. Otolaryng., 63:419-420 (April) 1956.

10. Sheehan, J. Eastman, and Swanker, Wilson A.: "Gelatinised" bone for repair of skeletal losses, Brit. J. Plast. Surg., 2:268-273 (Jan.) 1950.

11. Spangler, Arthur S.: A new treatment for pitted scars, Arch. Dermat., 76:708-711 (Dec.) 1957.

12. Rapin, M.: Eight years experiment with synethetic acrylic resins in rhinoplastic practice, Arch. Otol., Rhin. & Laryng., 11:425-427, 1949.

13. Vidaurre, Sergio: Saddle noses; their treatment with the semilunar cartilage of the knee joint, Plast. & Reconstruct. Surg., 10:35-38 (July) 1952.

DISCUSSION

WILLIAM CLYDE HUFFMAN, M.D., Iowa City, Iowa: I was very happy to hear Dr. Holmes advocate the simple septal procedure of breaking the spring of the septal cartilage and then moving it back to the midline, much the same as one would break the spring of the auricular cartilage in doing an otoplasty. I have been talking about this procedure for several years, and I always had the feeling that the listeners were paying polite attention but then were going away and doing some of the more complicated procedures that appear in the literature, because they look a little more intriguing. I hope, now that a man of Dr Holmes' stature has spoken in favor of the simple breaking of the spring, that my listeners will pay a little more attention to what I have to say in the future about it.

I was contemplating asking Dr. Holmes whether an alar defect ever resulted from swinging such a large segment of alar cartilage on the dorsum of the nose. On second thought, I need not ask him this; if he had seen such defect, he would have told us about it at the time he made his presentation.

I was also happy to hear Dr. Holmes condemn—in a very polite way—the use of metals and plastics, because one sees so much about these in the literature; one even sees advertisements of ready-made implants to be inserted into the nose. One begins to feel a little backward if he does not use them. However, once one has seen a metal implant in a nose, especially one that is ready-made, he becomes much less inclined to ever use them.

I remember particularly one case I was shown when I was visiting a clinic. This patient had been called in from a very long distance on a very cold day. The metal implant started somewhere up above her glabella and came straight down to the tip of her nose. The patient's nose was blue. She had just come in from out-of-doors, and when I put my hand on her nose, I wanted to jerk it away—it was so cold.

The man who had called the patient in and who had done the operation said, "Don't you think that is a rather good result?" Well, what was one to say in a case like that except, "Yes, I certainly think it is beautiful."

I am highly in favor of this fine sculpturing that is done on the bone graft to be put into the nose, because we all know that the more bone-to-bone contact we can establish, the more likely we are to get good survival of bone grafts.

JOHN M. CONVERSE, M.D., Chairman: Dr. Holmes, will you proceed with the questions?

Have any of your patients ever had a collapse of the ala?

DR. HOLMES: I have not had a real collapse. In one of the cases, you may have noticed, there was a little pinching. I always save a rim of cartilage at least an eighth of an inch wide, along the lower border of the ala. That prevents collapse. The rest of the contour is usually maintained by the alar swing itself and the lateral cartilages.

Have you found that sculpturing helps?

DR. HOLMES: It does help. I mentioned that I first shape the cortex *in situ*, then remove a large block of bone. It is the cancellous portion that must be shaped. If you use a sharp gouge, rasp, and motor-driven burr, you can shape an implant quite rapidly.

How do you put the sutures in the alar swing?

DR. HOLMES: When you have made the incisions mentioned and have freed the alae, you can lift them out of the vestibule so that you are working on them under direct vision. The two alae are first sewed together. To hold them in the midline, a suture is placed in the tip of the alar swing, then carried under the skin and brought out at the dorsum near the radix nasi. The free end is then threaded through the needle and brought to the dorsum in a similar manner so that we have a loop of suture holding the tip in place. Let me illustrate [sketch on blackboard].

It is a very easy thing to do, because you can bring them out and work on them directly.

Do you cut that suture as it comes out of the skin?

DR. HOLMES: No. I put a little adhesive on the free ends, to hold them in place. When the first dressing is done, the 000 or 0000 sutures will have dissolved.

The outside suture is not tied?

DR. HOLMES: No. It does not leave a scar at all, except for the scar made by the catgut as it comes out of the skin.

Are bone grafts placed with the periosteum beneath or next to the skin?

DR. HOLMES: The periosteum is removed. There is none on the graft at all.

Does a groove develop in the ala where the cartilage has been obtained for transposition?

DR. HOLMES: I think we have already answered that. It has not been apparent, except in that one case I showed tonight.

Have you ever used freeze-dry cartilage as an implant?

DR. HOLMES: No. Of course it is claimed that the cells in such material will be viable for some time. I have not used it, so I have had no experience with it.

How do you put the hip graft under the lower cartilages?

DR. HOLMES: It is sutured between the medial crura of the alar cartilages.

You said that you make your incision about 2 or 3 mm. back of the alar rim. How do you get the graft behind it?

DR. HOLMES: Let me illustrate with this crude drawing [sketch on blackboard]. The incision is made through the vestibular skin to the undersurface of the cartilage. The vestibular skin is next separated from the lateral wings of the alae to the upper lateral cartilages. The two medial crura are next separated from within out so that the graft may be received.

What is the fibrin that was injected under the skin?

DR. HOLMES: Fibrin is one of the fractions of blood which has been isolated. Its use was described in the *Annals of Dermatology* this past year.

DR. CONVERSE: There is one point which I think has not been discussed—that is the question of the rigidity of the nose following bone grafts. Dr. Holmes' conclusion is that of all the implants that have been employed in the nose, the most satisfactory appears to be autogenous bone, bone taken from the patient. Its superiority lies in the fact that it becomes adherent to the patient's nasal bones, does not become displaced from its original position, and does not become absorbed.

But to what extent does this bone graft, when it is extended to the tip, and then when it is extended downward by a columellar strut when it is fixed to the nasal spine, cause rigidity of the nose? What complications have resulted from this? In how many cases, for example, have you observed fracture of the bony implant, and what solution is there to this problem of rigidity, if you recognize that there is rigidity?

DR. HOLMES: As I mentioned, fixation is one of the big drawbacks to a bony implant. Whenever I can avoid one, I try to do so.

As I showed in the series just presented, I do not think you can get away from a rigidity if you use a bony implant that forms a bony union with the rest of the nose. About all we can do is to warn the patient not to bang it; and if he does, to come back quickly to reduce it and fix it until it is healed.

DR. HUFFMAN: Since this subject was brought up, I would like to tell a little tale along that line.

Just a few months ago a patient came to us who said that he had had a bone graft for correction of a saddle nose. His complaint was that the bone graft was loose—we could take this graft and turn it almost at right angles.

It obviously had not formed a union with any underlying bone.

I was taught that in order to get a bone graft to take, one had to have it in contact with bone. I told the patient that I believed the graft was cartilage.

We took out this graft and replaced it with a cancellous bone graft. The specimen taken from his nose was sent to the laboratory. The report was that it was a patternless mixture of cancellous and cortical bone.

DR. HOLMES: I think we have all seen cases in which bone grafts have remained free in the nose and apparently retained—not in toto, but in large part.

DR. CONVERSE: To get back to this business of rigidity of the nose, I think we often have the type of bony implant that is inserted not quite to the tip. In those cases, there is mobility of the lower portion of the nose. There is a shock absorber mechanism, such as is in the normal nose. Then, in the type of case which Dr. Holmes has described, in which the dorsal implant comes down between the medial crura, it must be supported by a columellar implant. I believe the following technique, which I have used now for the past two years, may be used in such cases.

With this technique, instead of using a subperiosteal connection between the columellar strut and the nasal spine, which results in most cases in consolidation of the columellar strut, you leave the columellar strut superiosteally so that it does not become consolidated and becomes progressively absorbed. During the time it is present, it serves as the support of the dorsal portion, which then becomes consolidated to the nasal bones.

Once the consolidation has occurred, the tip will remain in the proper degree of reflection. You restore the mobility because you do not have that L-shaped type of graft.

Dr. Holmes, I should like to know your reaction to this type of idea.

DR. HOLMES: I think that your idea is a good one if it is necessary to use a columellar strut. But since I have been using the technique of molding the graft so that the tip supports itself, I have not had to use the columellar strut support except, as I mentioned, in one or two cases in which there was some retraction of a columellar nasolabial angle; then there was merely the need for inserting an implant in front of the premaxillary spine.

Dr. Holmes, have you ever found that your cancellous bone graft will remain viable over the bony portion of the implant area but is absorbed over the cartilage because there is no periosteum in that area?

DR. HOLMES: No, I do not think so. There may have been some absorption, but not enough to be disturbing.

In some very thin-skinned dorsums, there is not much padding over the graft. Have you ever utilized a dermal fat graft to supply a certain amount of connective tissue under the skin, particularly when the graft is absorbed and some revision is necessary?

DR. HOLMES: No, I have not. But that is a logical solution of such a problem.

You have stated that cartilage grafts curl in most instances. I believe that there has been some work done recently in which the cortical portion of the cartilage is removed, and just the center portion used. In those instances there has been no curling. Do you know anything about that?

DR. HOLMES: I have read of it, but I have not tried it on a patient. I have tried it on cartilage, but I had difficulty in sculpturing it so that I could be sure it would not curl.

Have you used conchal cartilage, Dr. Holmes?

DR. HOLMES: I have used conchal cartilage. Sometimes I have taken conchal cartilage from both ears, putting the two pieces together for thickness. One may secure quite a lot of cartilage this way without interfering with the contour of the ear.

In Memoriam

George C. Albright.....Iowa City, Iowa
February 1, 1959

Carl C. Beisbarth.....St. Louis, Missouri
March 13, 1959

Augustus J. Blickenstaff.....Peoria, Illinois
February 11, 1959

Lee B. Bouvy.....LaGrande, Oregon
February 18, 1959

Robert J. Bowman.....Beverly Hills, California
August 19, 1955

Kenneth C. Brandenburg.....Long Beach, California
March 10, 1959

Ralph Bryan Fast.....Kalamazoo, Michigan
March 24, 1959

Roger R. Flickinger.....Mason City, Iowa
June 13, 1959

Harold James Gibby.....Worcester, Massachusetts
March 2, 1959

Harold M. Griffith.....Johnstown, Pennsylvania
March 26, 1959

Jacob Franklin Gsell.....Wichita, Kansas
February 12, 1959

William Howard Heine.....Fremont, Nebraska
January 24, 1959

Virgil Eugene Holcombe.....Charleston, West Virginia

Alexander L. Moshinsky.....New York, New York
March 25, 1959

Lawrence James Nacey.....Rochester, New York
March 26, 1959

James J. Richardson.....Fort Worth, Texas
March 7, 1959

TRANSACTIONS

American Academy of Ophthalmology and Otolaryngology

Official Publication of the American Academy of Ophthalmology and Otolaryngology

Published under the direction of the Editorial Board
WILLIAM L. BENEDICT, Rochester, Minnesota, *Editor*
W. HOWARD MORRISON, Omaha, Nebraska, *Associate Editor*
HENRY L. WILLIAMS, Rochester, Minnesota, *Associate Editor*
Printed by Douglas Printing Company, 109 North 18th Street, Omaha 2, Nebraska

William L. Benedict, M.D., LL.D., Executive Secretary-Treasurer
American Academy of Ophthalmology and Otolaryngology
15 Second Street S.W., Rochester, Minnesota

SI, SENOR! CLINICS OF MEXICO

The social program of Clinics in Mexico has been carefully worked out to add the greatest amount of relaxation and fun possible to the comprehensive sight-seeing.

On Saturday, October 17, we leave Chicago on American Airlines "Royal Coachman," DC-7, nonstop. Lunch will be served immediately after departure. This flight gives the fastest service between Chicago and Mexico City, and while the seats allotted to us are limited, we have been able to secure a small addition to our original allotment because of the great interest in the Clinics, and the large number of deposits already received. Make your decision now to go. Hurry! Don't miss this flight!

On Sunday morning, we shall visit the Tiffany Glass Curtain, which depicts the volcanoes of "Popo" and "Ixta" in colored glass mosaics and is shown only on Sunday mornings. Following this, we will visit Churubusco Convent, an architectural gem made more inviting with its fine old gardens.

From there, we shall go to Xochomilco, an Aztec word meaning "flower gardens." Xochomilco is the last indication of the way the Montezuma Empire looked to the conquering Spaniards. This is one spot where progress has not encroached; it has remained the same for nearly six centuries. At Xochomilco we shall ride down the canals between the gardens in "canoas" poled by Mexican gondoliers (fig. 1). On our return to the hotel, we shall have lunch and the afternoon will be free for those who may wish to see the bullfight.

The "Corrida" starts promptly at four o'clock, and the crowd is one of the most animated and colorful in the world. The thing to remember about the bullfight is that nothing happens just by chance. From the moment that the parade enters the ring, until the last bull is dragged away, every act and gesture is dictated by centuries of tradition; each has its symbolic or ritual significance.

Monday afternoon will be spent touring Mexico City, which combines the early cultures of the oldest Indian-European city in the western hemisphere with the modernity of today. Mexico City has been growing fast. It is a source of astonishment to all who see it today, with sharp contrasts in mood, the old with the new, the quaint with the fu-

FIG. 1—Xochomilco

turistic. Mexico City today has new and beautifully created residential and industrial suburbs, wide boulevards, lovely parks and interesting monuments. We shall visit the largest cathedral in the Americas, the National Museum with the Calendar Stone and famous Diego murals, and Chapultepec Park and Castle, a site chosen by Aztec Emperors for their homes. The afternoon will be climaxed by a drive through Mexico City's lovely residential section.

On Wednesday, we shall visit the Pyramids. This will be a wonderful day. When you stand before the noble Pyramids to the Sun and to the Moon at San Juan Teotihuacan and wonder what people built such temples, and when, and why—remember that the first Aztecs, who came to the Valley of Mexico almost a thousand years ago, probably felt as you do today. The ancient city, covered with brush and vegetation, was there at that time, and no one knows for how many centuries before. There are no data on the city and its founders. Wise archeologists simply say, "We don't know," though continuing archeological exploration reveals new treasures each year.

On the return, we shall stop at the ruined Monastery of Acolman, among the finest of early fortress-type churches, dating from 1539. You'll find rare and interesting frescoes here.

Our final stop will be at the Shrine of Guadalupe, the most famous and beloved shrine in Mexico. It honors "The Blessed Virgin of Guadalupe, Patroness of the Americas," whose dark-skinned, gentle face appears above the altar of the Basilica—on the mantle of Juan Diego.

On Thursday, we shall leave for a two-day trip—a composite of highlights. Our first stop is the Pedregal, which less than ten years ago was one of the most desolate spots in the area, a bed of lava, the early outpouring of a small volcano. Today, the homes you see in this suburb represent the world of tomorrow in design and comfort. Some have swimming

pools literally scooped out of the lava rock. The gardens are lovely.

Our next stop is University City, a fifty million dollar successor to the first university in the Americas founded here in 1551. Imagine these sights: 80 buildings incorporating the best of Indian, Spanish and ultramodern architecture, with lava stone as the basic building material; a crater-shaped stadium which seats 102,000 persons; sports courts reminiscent of an ancient Mayan city; the world's largest swimming pool with glass-roofed rooms underneath; a Liberal Arts building almost one-fourth mile long; Science section with seven amphitheatres, and, attracting most interest of all, a 12-story Library with room for more than a million books, because it has no windows. Walls are solid and covered with stone mosaics telling the history of Mexico in the largest mural ever designed—the work of artist Juan O'Gorman (fig. 2).

Our next stop is Cuernavaca, which was the playground of the Aztec emperors, of Cortez, and of Maximilian and Carlotta, who lived in the Borda Garden Mansion, where we shall stop. Cuernavaca is the home of a number of North Americans, and the country retreat of ambassadors, presidents, outstanding writers, artists and film colony celebrities.

FIG. 2—Library of the University of Mexico

We shall reach Taxco for lunch. A sudden turn in the road reveals the first startling sight of this little village clinging to its mountainside. Red-tile-roofed houses rise one above another up the steep hillsides, painted white or in rainbow tones. The effect is such that one could think some giant artist made the mountains his canvas and painted Taxco on it.

Narrow cobblestone streets lead from the highway to the town's two plazas, and from there many winding cobbled trails lead to those enchanting hillside

homes. Only one thoroughfare wide enough for traffic continues upward, and on this is one of the most unique hotels on the continent, Rancho Telva, where we shall spend the night.

Friday, on our return to Mexico City, we shall stop at the Hacienda Vista Hermosa for lunch, a lovely resort built on the site of the Hacienda which was started by Herman Cortez four centuries ago.

Some members of the party will be leaving for their homes on Friday night; some will leave on Saturday morning, and others will be leaving for Acapulco.

Have you made your reservations for Clinics of Mexico? If not, do not delay.

Clinics of Mexico are again available to Academy members and their friends who may not be able to attend the Chicago meeting. Some will go direct from their homes to Mexico City, enjoy the full program, and return to their homes. But, for full participation in the social and professional activities, reservations must be made through the official agent, Leon V. Arnold, 33 Washington Square West, New York City 11. He is in charge of all travel arrangements.

LETTER TO THE EDITOR

May 7, 1959

Dear Dr. Benedict:

Please find enclosed a reprint (in Danish) of a paper in the journal *Nordish Medicine* from March 26, 1959. The term "Nordish" (Northern) comprises Denmark, Norway, Finland and Sweden, and this medical journal is one of the common northern enterprises.

As you may not be interested in a complete translation allow me just to give you an idea of what it contains: The title means the post-graduate training in ophthalmology, and the subtitle literally: northern ophthalmological correspondence course.

First I compare the American training in ophthalmology with the Scandinavian (northern), mention the American Board examination, the absence of an examination in ophthalmology here and the stimulus to study which an examination means. Then I describe what part the Home Study Courses play in the U.S., the many courses in ophthalmology in the U.S., the necessity of making the already existing northern courses in ophthalmology more intensive and more frequent. I mention my letter to you in April last year about the Home Study Courses and your generous reply, my propaganda for the course and the almost unanimous approval by the ophthalmology professors, the names of the ophthalmologists who grade the papers, how the course works, an evaluation of the papers in anatomy by Professor Ehlers, and finally I suggest arranging courses like the Academy courses.

In the same issue of the journal was an editorial with the title "Home Study Course" written by the Danish editor of the journal. He writes that this course deserves great attention, and now a Danish otolaryngologist, *Dr. Carsten M. Smidt*, address: *Sct. Elisabeth Hospital, Naestved, Denmark*, has asked me to inquire if he might get the otolaryngological material from the Academy for the next period beginning in September. I will be very grateful for an answer either to him directly or to me.

Very truly yours,

(Signed) KNUD K. DREISLER

AN IMPORTANT MESSAGE . . .

A.A.O.O. Members' Professional Liability Insurance Program

JOSEPH K. DENNIS COMPANY, INC.
Insurance Counsellors
CHICAGO, ILLINOIS

(This is the first article in a two-part series.)

In the past, many articles have been written regarding the doctor and his Professional Liability Insurance. Your membership in the American Academy of Ophthalmology and Otolaryngology makes available to you a *special* Program of Professional Liability Insurance.

At the direction of Dr. William L. Benedict, Executive Secretary-Treasurer of the Academy, the important features of the Academy's Professional Liability Insurance Program will be discussed in this article and one subsequent article to follow.

The following is an index of the important points to be discussed:

1. What advantages are afforded American Academy of Ophthalmology and Otolaryngology members through participation in the Academy's Professional Liability Insurance Program?
2. What is meant by the term *National Bureau?*
3. What protection is afforded the insured member under a standard National Bureau Professional Liability Insurance policy, being issued Academy members?
4. How are Professional Liability Insurance rates established and would it ever be necessary to change these rates?
5. What limits of Professional Liability Insurance should a member carry?
6. What limits of liability are available through the Academy's Program?
7. To whom and how does the insured member report an incident that he feels may result in litigation against him?
8. Local legal counsel is appointed for the insured member's defense.
9. What facilities are employed in underwriting the Academy's Professional Liability Insurance Program?

Question:

1. What advantages are afforded American Academy of Ophthalmology and Otolaryngology members through participation in the Academy's Professional Liability Insurance Program?

Answer:

As a member of the American Academy of Ophthalmology and Otolaryngology, which enjoys such an excellent reputation, you gain definite premium advantages which are not afforded under individually purchased policies. A distinct advantage is that since you are working in one particular field of medicine, the underwriting company's efforts can be directed to the formation of the most comprehensive coverage available to your field of practice.

Since this is a specialty group, you are afforded protection at rates which are at least 10 per cent, and as much as 20 per cent, below the bureau rate for each state (excluding Florida).

You are provided security under the American Academy of Ophthalmology and Otolaryngology's Program, because no one in your local area will be aware of the limits of protection you are carrying, which, in most cases, could have a direct bearing on the amount of litigation brought against you.

The company underwriting your Professional Liability Insurance Program will pay all judgment awards up to your policy limits and will also pay all costs necessary for your defense, including lawyers, court, and investigation fees.

Also, before any claim is settled, the written consent of the doctor must be obtained. It has long been felt that the doctor should always have the final word regarding settlement.

Only legal experts in the field of malpractice insurance are appointed to defend you in any litigation which might be brought against you.

Question:

2. What is meant by the term "National Bureau?"

Answer:

The National Bureau was formed by the leading companies writing Professional Liability coverage for the protection of both the insured and the company. The principal function of the Bureau is the standardization of all provisions and clauses contained in the Professional Liability policy. Companies using the Bureau form can never change the wording unless it is approved by the Bureau.

Question:

3. What protection is afforded the insured member under a standard National Bureau Professional Liability Insurance policy being issued Academy members?

Answer:

When a standard National Bureau Professional Liability Insurance policy is issued, you have the assurance that this policy in its entirety, meaning every phrase and every word incorporated in the making of this policy, has, at one time or another been tested in court. The provisions of this policy are as follows:

To pay all sums which you shall become legally obligated to pay because of injury arising out of malpractice.

Also, with partnership and employee coverage, you are protected against any litigation or judgment which you could legally be held responsible for, whether legal or fraudulent as long as no criminal intention was meant by these acts.

The Statute of Limitation applying to your individual state is the governing factor for all litigations brought against you.

Question:

4. How are Professional Liability Insurance rates established and would it ever be necessary to change these rates?

Answer:

In every state there is a bureau rate that applies to each specific or particular field of medical practice. These rates are determined by previous loss experience. To the basic charge, additional premiums are added for additional exposures, such as: partnership, employed physicians or surgeons, cosmetic plastic surgery, x-ray technicians, and laboratory technicians. These additional charges are also determined by the previous loss experience. A policy that

incorporates any of these additional exposures protects you for any act that would be performed and which you could legally be held liable for. With your Academy's Program, there is no charge made for the use of a Nasopharyngeal Radium Applicator. This exposure is covered in the your basic premium.

As outlined above, these rates are based on previous loss experience. We can now go into why a company would need an increase or change in rates.

Experience simply means what litigation expense and judgment awards have been paid out for the various states. If the experience has been bad, which is the trend today, for which there are many reasons, one being the leniency of the courts to favor the plaintiff, rate changes must be made to conform with this trend. (However, good loss experience could reflect in a premium decrease.)

In some states there have been rate increases from 100 per cent up to 300 per cent during the last few years. With this ever increasing rise in judgment awards, many insurance companies are withdrawing from the field as Professional Liability Insurance carriers. There are approximately forty insurance companies writing some medical Profesional Liability Insurance. This figure fluctuates to the point where approximately 80 per cent of all medical Professional Liability Insurance is carried by approximately twenty American insurance companies, and approximately 75 per cent of this coverage is reinsured in Lloyds' of London.

Many of the companies that are withdrawing from the field have a twofold reason. One is the loss experience. The other is that they are now discovering that the servicing of this type of business entails a considerable amount of time of well-trained experts, which was not recognized before they entered into this field.

Under your American Academy of Ophthalmology and Otolaryngology's Program, the underwriters and administrators have, for many years, been handling this type of coverage and are considered among the best available. Your Academy's Program for Professional Liability Insurance is underwritten by the Interstate Fire and Casualty Company, using Lloyds' of London for reinsurance. The same underwriting company serves the American Academy of Dermatology and Syphilology, American College of Chest Physicians, Anesthesiologists of America, and other specialty groups in the field of medicine.

In the next issue of the TRANSACTIONS, the following subjects will be covered:

1. What limits of Professional Liability Insurance should a member carry?
2. What limits of liability are available through the Academy's Program?
3. To whom and how does the insured member report an incident that he feels may result in litigation against him?
4. Local legal counsel is appointed for the insured member's defense.
5. What facilities are employed in underwriting the Academy's Professional Liability Insurance Program?

FINANCIAL REPORT
Annual Audit for Calendar Year 1958

April 23, 1959

American Academy of
Ophthalmology and Otolaryngology
Rochester, Minnesota

Gentlemen:

We have examined the balance sheet of the American Academy of Ophthalmology and Otolaryngology (an unincorporated association), Rochester, Minnesota, as at December 31, 1958, and the related statements of income and net worth for the year then ended. Our examination was made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances, except we did not observe taking of physical inventories.

We submit herewith our report, which includes the following statements:

Exhibit

A—Balance Sheet as at December 31, 1958
B—Statement of Income for the year ended December 31, 1958
C—Analysis of Grants-in-Aid and Special Contributions
D—Analysis of Net Worth for year ended December 31, 1958
E—Analysis of Fluctuations in Market Value of Securities
F—Securities Owned, December 31, 1958

FINANCIAL CONDITION

The balance sheet as of December 31, 1958, appears in Exhibit A. The nature of the various assets and liabilities appearing on this balance sheet is described in the following comments.

Current Assets, $67,953.13

Cash in banks was reconciled with the balances confirmed to us by the depositaries. The funds in the Canadian bank are stated in U. S. dollars.

Membership dues receivable, in the amount of $1,570.00, consist of delinquent dues for 1958 and prior years which were verified from the records only. Other receivables, totaling $1,018.10, were taken from the records without further verification and consist of amounts due from members and others in the amount of $745.30 for slides, abstracts, manuals and monographs, and $272.80 due from various firms for advertising placed in the TRANSACTIONS.

The inventory of abstracts, manuals and monographs, bound volumes, slides and film strips, in the amount of $24,860.13, was taken from the inventory records as prepared by employees of the Academy without further verification except for testing of prices, extensions and footings. The major portion of the inventory was formerly held by the Academy's printer in Omaha, Nebraska, but was moved to Rochester, Minnesota in 1958.

Supplies, in the amount of $494.67, as inventoried by company employees without further verification by us, consist principally of lapel buttons which are awarded to Senior Fellows.

Prepaid postage deposit of $26.28 was verified by correspondence with the U. S. Post Office at Omaha, Nebraska.

The balance in prepaid insurance, totaling $591.82, was determined to be properly applicable to future operations.

Investments, $367,172.28

A schedule of stocks and bonds owned at December 31, 1958, is set forth in Exhibit F.

The investment in stocks and bonds is stated at market value, totaling $367,172.28, which is $64,769.60 in excess of cost at December 31, 1958.

The securities are held for safekeeping by the Trust Department of the First National Bank of Minneapolis, Minnesota, and were confirmed by direct correspondence with the custodian.

Interest earned on bonds since the last payment date has not been accrued.

An analysis of the change in market value of these investments since acquisition is set forth in Exhibit E.

As noted above, the market value of securities at December 31, 1958, was $64,769.60 in excess of cost. This increase is primarily the result of the relatively low security market prices at December 31, 1957.

Other Assets, $39,610.31

Other assets consist of unrecovered cost to date of the compilation of the Atlas of Otolaryngic Pathology of $23,724.96, and the incurred costs to date of compilation of the "Atlas of Slit-Lamp Gonioscopy" of $15,885.35.

Since publication, the sales of the Atlas of Otolaryngic Pathology have totaled $23,494.07, which represents approximately half of the original expenditure by the Academy. It is anticipated that the remaining cost will be recovered through future sales of the Atlas.

The "Atlas of Slit-Lamp Gonioscopy" is another publication being sponsored by the Academy. This Atlas is still in process of compilation and arrangements for publication and distribution have not been completed. The total cost to date of $15,885.35 primarily represents the cost of color plates.

Fixed Assets, $80,005.06

Furniture and equipment amounting to $19,599.42 is stated at cost except for equipment acquired prior to September 1, 1942, which was appraised at $1,420.28 as of January 1, 1944. Subsequent purchases of equipment have been verified through an examination of invoices and supporting vouchers. New equipment purchased during the current year amounted to $682.73. Depreciation rates appear to be reasonable in relation to the estimated life of the depreciable property.

The cost of motion picture films and slides entitled "Embryology of the Eye," totaling $41,775.00, and "Embryology of the Ear," totaling $104,516.62, represents the original production cost of these films and slides prepared by Sturgis-Grant Productions, Inc., and is being amortized at a rate that appears reasonable. Prints can be made from the master films on order.

Current Liabilities, $55,891.02

The bank overdraft was reconciled with the balance confirmed to us by the depository.

Accrued expenses of $7,313.51 represents principally unpaid printing cost of December TRANSACTIONS and current operating expenses.

Prepayments for Bound Volumes, etc., totaling $5,332.00, consist of deposits made by members of the Academy and others for Bound Volumes and periodicals to be delivered in 1959 and advance payments for exhibit booths at the 1959 convention.

Grants-in-aid, totaling $39,794.44, are summarized in Exhibit C. This total represents the unexpended balance of two National Institutes of Health grants, 3-B-9023 (C1) "Use of Diagnostic Procedures and Therapy in Uveitis" and 3-B-9045 (C1) "Conservatior of Hearing in Children."

Net Worth, $492,693.71

The net worth of the Academy, as shown in Exhibit D, increased from $414,658.16 on December 31, 1957, to $492,693.71 on December 31, 1958, or a total of $78,035.55. While the net income from operations for the year amounted to $17,742.35, securities held by the Academy increased in value by $60,293.20.

OPERATIONS

A comparative statement of income for the years ended December 31, 1958 and 1957, is as follows:

	Year ended: Dec. 31, 1958	Dec. 31, 1957	*Increase* **Decrease**
Revenues	$280,524.34	$275,376.63	$ 5,147.71
Operating Expenses:			
General Administrative	108,884.10	88,136.79	20,747.31
Educational Fund	18,047.04	20,428.12	**2,381.08**
Home Study Courses	10,199.15	8,357.57	1,841.58
Convention expenses	57,238.19	57,344.40	**106.21**
TRANSACTIONS	68,462.67	78,440.85	**9,978.18**
Total operating expenses	262,831.15	252,707.73	10,123.42
Operating Income	17,693.19	22,668.90	**4,975.71**
Other Income	49.16	37.33	11.83
	17,742.35	22,706.23	**4,963.88**
Other Deductions:			
Loss, securities		687.27	**687.27**
Net Income	$ 17,742.35	$ 22,018.96	**$4,276.61**

The decrease in net income of $4,276.61 results primarily from the addition of a pathology consultant to the staff and general increases in cost of doing business.

The increase in general administrative expenses of $20,747.31 resulted in part from a change in the classification of the cost of publishing the Directory, which amounted to $7,250.00 in 1958. In previous years the cost of publishing the Directory was charged directly to TRANSACTIONS, which showed a decrease of $9,978.18, for the year 1958, as shown above.

GENERAL

At December 31, 1958, the Academy had the following insurance coverage:

Type of Coverage	*Amount*
Fire and extended coverage:	
Contents (80% co-insurance)	$10,000
Bound Volumes, manuals and abstracts	15,000
Equipment floater	25,157
General liability:	
Bodily injury	100,000/300,000
Property damage	5,000/25,000
Forgery and check alteration	10,000

In addition the Academy carried workmen's compensation insurance at satutory amounts including coverage for help hired at the annual convention; a fidelity bond on the executive secretary, $25,000.00; and other office employees, $2,500.00. A broad form policy is being carried covering the destruction or disappearance of money, securities and other property up to $3,225.00 within the premises, and $2,100.00 outside the premises when conveyed by a messenger. At the annual convention, this coverage is increased to $40,000.00, with a limit of $20,000.00 on money.

We acknowledge the very courteous assistance extended to us by Dr. W. L. Benedict, Executive Secretary-Treasurer of the Academy, and his office staff during the course of our examination.

OPINION

In our opinion, subject to the comments in the preceding paragraphs, the accompanying balance sheet and related statement of income and net worth present fairly the financial position of the American Academy of Ophthalmology and Otolaryngology at December 31, 1958, and the results of operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Respectfully submitted,
BYERS, WOBSCHALL & MILLER
Certified Public Accountants
By Edw. A. Wobschall, C.P.A.

EXHIBIT A

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY
(An Unincorporated Association)
Balance Sheet as at December 31, 1958

ASSETS

Current Assets:			
Petty cash fund		$ 25.00	
Cash, First National Bank of Minneapolis		36,291.52	
Cash, Bank of Montreal, Toronto, Canada		3,075.61	
Membership dues receivable, delinquent		1,570.00	
Accounts receivable, other		1,018.10	
Inventory, abstracts, manuals, films		24,860.13	
Inventory, supplies		494.67	
Prepaid postage		26.28	
Prepaid insurance		591.82	
Total current assets			$ 67,953.13
Investments, at market value (Exhibit F):			
Bonds and stocks (cost $302,402.68)			367,172.28
Other Assets:			
Atlas of Otolaryngic Pathology (cost of compilation less sales of Atlas)		23,724.96	
Atlas of Slit-Lamp Gonioscopy (cost of Atlas in process of compilation)		15,885.35	39,610.31

Fixed Assets:	*Gross amount*	*Accumulated depreciation*	*Net*	
Furniture and equipment	$ 19,599.42	$ 10,520.47	$ 9,078.95	
Film and slides:				
Embryology of the Eye	41,775.00	36,553.75	5,221.25	
Embryology of the Ear	104,516.62	38,811.76	65,704.86	
Total	165,891.04	85,885.98	80,005.06	80,005.06
TOTAL ASSETS				$554,740.78

LIABILITIES AND NET WORTH

Current Liabilities:		
Bank overdraft, Northwestern National Bank of Rochester	$ 1,271.65	
Accrued expenses	7,313.51	
Accrued payroll taxes	2,024.42	
Prepayments for Bound Volumes, etc	5,332.00	
Grants-in-Aid (Exhibit C)	39,794.44	
Deferred income, membership dues	155.00	
Total current liabilities		$ 55,891.02
Wherry Memorial Lecture Fund Balance (Exhibit C)		6,156.05
Net Worth (Exhibit D)		492,693.71
TOTAL LIABILITIES AND NET WORTH		$554,740.78

EXHIBIT B

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY
Statement of Income for the Year Ended December 31, 1958

Revenues:			
Membership dues			$ 72,677.00
Membership applications			5,220.00
Abstracts, manuals and monographs			10,160.90
Certificates			1,294.00
Films and slides			1,475.00
Testing and calibration of tonometers			1,216.00
Royalties, Atlas and Textbook of Ophthalmic Pathology			662.84
Convention			87,019.00
Home Study Courses			8,494.00
TRANSACTIONS			76,346.91
Income from securities:			
Interest		$ 3,858.79	
Dividends		11,795.83	15,654.62
Other income			304.07
Total revenues			280,524.34
Operating Expenses:			
General administrative		108,884.10	
Educational Fund:			
Trustee fees	$ 313.42		
Depreciation, films and slides	14,629.16		
Embryology of Ear: Album	304.46		
Scholarship award	2,800.00	18,047.04	
Home Study Courses		10,199.15	
Convention expenses		57,238.19	
TRANSACTIONS		68,462.67	262,831.15
Operating Income			17,693.19
Other Income:			
Gain on sale of securities			49.16
Net Income for the Year			$ 17,742.35

EXHIBIT C

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY
Analysis of Grants-in-Aid and Special Contributions
for the Years Ended December 31, 1958

			UNEXPENDED BALANCE DEC. 31, 1958
N. I. H. GRANT-IN-AID NO. 3-B-9023 & 3-B-9023 (c1) (UVEITIS)	3-B-9023	3-B-9023 (c1)	
Balance, December 31, 1957	$ 32,906.07		
Receipts for Year 1958:			
Treasury of United States		$ 21,528.00	
Transfers by order of N. I. H.	(10,714.02)	10,714.02	
	22,192.05	32,242.02	
Disbursements during 1958	22,192.05	8,863.82	
Balance, December 31, 1958	None	$ 23,378.20	$ 23,378.20
N. I. H. GRANT-IN-AID NO. 3-B-9045 & 3-B-9045 (c1) (HEARING)	3-B-9045	3-B-9045 (c1)	
Balance, December 31, 1957	$ 47,739.40		
Receipts for Year 1958:			
Treasury of United States		$ 31,100.00	
Transfers by order of N. I. H.	(6,481.70)	6,481.70	
	41,257.70	37,581.70	
Disbursements during 1958	41,257.70	21,165.46	
Balance, December 31, 1958	None	$ 16,416.24	$ 16,416.24
SUB-COMMITTEE ON NOISE IN INDUSTRY			
Balance, December 31, 1957		$(1,173.36)	
Receipts for year 1958:			
Contributions received from outside sources		74,616.40	
Refunds from Sub-Committee		1,314.91	
		74,757.95	
Disbursements during 1958:			
Payroll of Sub-Committee	$ 72,964.00		
Social security tax on above	896.12		
Transfers to Sub-Committee, other	897.83	74,757.95	
Balance, December 31, 1958		None	
Total unexpended balance, December 31, 1958			$ 39,794.44
WHERRY MEMORIAL LECTURE FUND			
Balance, December 31, 1957			$ 5,940.05
Receipts for 1958—Dividends			216.00
Balance, December 31, 1958			$ 6,156.05

EXHIBIT D

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY
Analysis of Net Worth for the Year Ended December 31, 1958

Net Worth, December 31, 1957		$414,658.16
Add:		
Net income for year ended December 31, 1958 (Exhibit B)	$ 17,742.35	
Increase in market value of securities during 1958 (Exhibit E)	60,293.20	78,035.55
Net Worth, December 31, 1958		$492,693.71

EXHIBIT E

Analysis of Fluctuation in Market Value of Securities
For the Year Ended December 31, 1958

	COST	MARKET	INCREASE
December 31, 1957 (audit report)	$230,110.24	$244,586.64	$ 4,476.40
December 31, 1958 (Exhibit F)	302,402.68	367,172.28	64,769.60
Difference	$ 62,292.44	$122,585.64	$ 60,293.20

EXHIBIT F

American Academy of Ophthalmology and Otolaryngology

Securities Owned, December 31, 1958

EDUCATIONAL FUND

BONDS	RATE %	MATURITY	PAR VALUE	COST	MARKET VALUE	
Citizens Building Co. of Cleveland, 1st Leasehold Sinking Fund	6	1/ 1/46	$ 5,000.00	.....	.....	(1)
Van Sweringen Co. Certificates of Indebtedness, Series 1925	6	12/31/48	1,030.00	$ 822.03	$ 25.75	(2)
Dominion of Canada	3¼	10/ 1/79	3,000.00	2,595.00	2,610.00	(3)
Dominion of Canada	3¼	10/ 1/79	5,500.00	5,612.34	4,785.00	(3)
Dominion of Canada	4½	9/ 1/83	2,000.00	2,000.00	1,915.00	(3)
Dominion of Canada	4½	9/ 1/83	7,500.00	7,500.00	7,181.25	(3)
U. S. Savings Bonds, Series G	2½	3/ 1/59	15,000.00	15,000.00	15,000.00	
U. S. Treasury Bonds	3¼	5/15/85	40,000.00	39,350.00	36,200.00	
Total Bonds				$72,879.37	$67,717.00	

STOCKS	KIND	PAR VALUE	SHARES			
Citizens Building Co. of Cleveland	Shares	No par	50	.....	.....	(1)
Commonwealth Edison Co.	Common	$ 25.00	102	$2,294.56	$ 5,801.25	
E. I. du Pont de Nemours & Co.	Common	5.00	60	2,347.31	12,825.00	
Northern Illinois Gas Co.	Common	5.00	34	401.44	956.25	
Central Maine Power Co.	Common	10.00	200	5,225.00	5,050.00	
Investors Diversified Services	Common A	1.00	100	6,785.95	18,000.00	
Bank of America Nat'l Trust & Savings Assn.	Common	6.25	100	3,950.00	4,200.00	
Weco Products	Common	1.00	300	4,125.00	4,987.50	
Farwell, Ozmun, Kirk & Co.	Capital	50.00	100	7,800.00	7,000.00	
Anchor Casualty Co.	Preferred—1.75 Cum.	10.00	100	4,075.00	3,333.33	
Louisville Gas & Electric Co.	Preferred—5%	25.00	200	5,450.00	5,600.00	
Kaiser Aluminum & Chemical	Preferred—4¼%	100.00	50	5,000.00	5,500.00	
Texas Eastern Transmission	Preferred—5.75	100.00	150	15,038.00	20,250.00	
Incorporated Income Fund	Capital	1.00	3,170	31,674.30	29,290.80	
The One William Street Fund, Inc.	Capital	1.00	2,040	25,010.40	26,622.00	
Massachusetts Investors Trust	Trust Certif. B/1	.33⅓	4,002	20,860.99	53,666.82	
Incorporated Investors	Capital	1.00	3,789	32,373.10	36,715.41	
Wellington Fund, Inc.	Common	1.00	3,909	51,712.26	54,256.92	
Total Stocks				$224,123.31	$294,055.28	
TOTAL SECURITIES				$297,002.68	$361,772.28	

WHERRY MEMORIAL FUND

Rochester Building and Loan Assn.	Capital	100.00		5,400.00	5,400.00	
TOTAL INVESTMENTS				$302,402.68	$367,172.28	

(1) Charged off in 1955—no market available

(2) In process of liquidation (original par value, 6,000.00)

(3) In U. S. dollars

NEW ARTIFICIAL LARYNX

TODAY there are more than 35,000 individuals in this country who have had their larynx removed. Some lesser numbers have had a partial laryngectomy. Available data indicates that the frequency of surgical procedures on the larynx has increased steadily during the past six years. In the United States alone the present rate of laryngectomy operations is about 2500 per year. And the problem isn't limited to this country. Many of these laryngectomees can learn to communicate by esophageal speech, for which an artificial larynx is not required. But a sizable number are unable to master esophageal speech, and their only means of speaking is with an artificial larynx.

A new artificial larynx for persons who have lost their voices through surgical removal or paralysis of their vocal cords was described by three Bell Telephone Laboratories' scientists at a recent meeting of the Acoustical Society of America. Still in the experimental stage, it is the result of a considerable background of research in an interdisciplinary field of science known as psychoacoustics.

Great impetus to development of the device was given by some of the nation's foremost surgeons connected with the National Hospital for Speech Disorders. They felt that with the great advances in electronics brought about by the transistor, specialists in acoustics research could devise a far better artificial larynx than any presently available.

With a minimum of difficulty and training, laryngectomees can use the new electronic larynx to speak conversationally. It is especially effective when conversing over the telephone. By means of a finger-operated combination push-to-talk switch and inflection control, the user can easily control the pitch of his artificial voice, thus giving his speech a natural sounding quality previously unobtainable.

The underlying principle of the new artificial larynx is a vibrating driver (transducer) held against the throat. Completely self-contained and cylindrically shaped, it measures only 1.75 inches in diameter by 3.25 inches long (fig. 1). Included in this one small package is a modified telephone receiver serving as the throat vibrator, a highly-efficient transistorized pulse generator with pitch control, and a battery power supply.

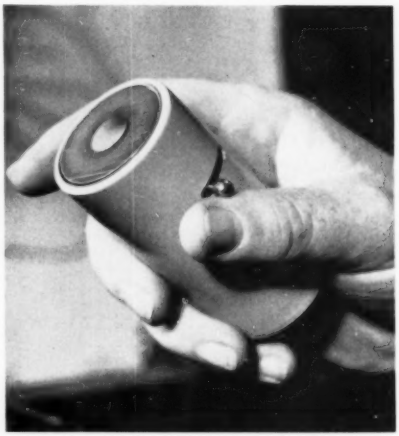


FIG. 1—New electronic artificial larynx utilizes a modified telephone receiver (diaphragm with small center disk attached) which transmits sound through flesh into person's throat. By manipulating pitch control switch while talking, user's "artificial voice" can sound very natural.

To use the unit, the laryngectomized person presses the vibrator against his throat (fig. 2). Switching on the pulse generator with his finger, by normal use

FIG. 2—While F. E. Haworth (right) speaks by means of artificial larynx, H. L. Barney takes reading on a sound-level meter. Output speech volume is equivalent to that of normal talker. Both men played important roles in the development of the electronic larynx.

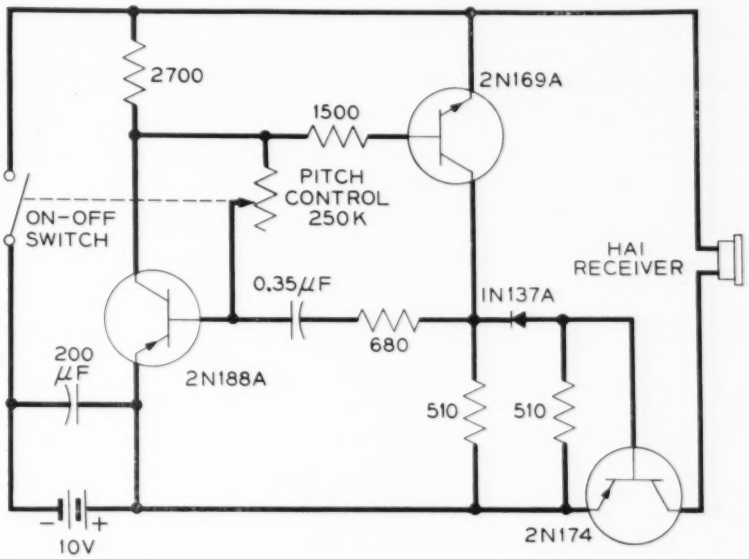


FIG. 3—Highly efficient pulse generator with pitch control employs three transistors. Its circuit parameters are adjusted to yield maximum acoustic output with a minimum of current drain. A single-ended power output stage, using the 2N174 transistor, amplifies the pulses applied to it through the 1N137A diode.

of the articulatory mechanisms — i.e., throat cavity or pharynx, tongue, mouth, teeth, and lips—in his vocal tract, he transforms vibrations transmitted into his throat cavities into speech sounds.

Output speech volume obtained with the artificial larynx is equal to that of a person speaking at a normal conversational level, though the sound is a bit buzzy and mechanical. Nevertheless, the frequency spectra of vowel sounds show that the frequency range transmitted into the person's throat is sufficient for satisfactory production of such sounds. And while intelligibility tests give results lower than those of normal speech, they are superior to those of any other artificial larynx. Users of the new artificial larynx can achieve a sentence intelligibility of 97 per cent or more, depending on their experience.

Because the artificial larynx requires an economical, self-contained power source, circuit parameters had to be adjusted to yield maximum acoustic output with a minimum of current drain (fig. 3). Accordingly, two transistors are used in a relaxation oscillator whose frequency is controlled by a variable resistance, and whose pulse width is determined by a feedback network. The output is a negative pulse which occurs at a frequency of about 100 cycles per second. This repetition frequency may be varied from about 100 to 200 cycles by a rheostat which the user operates by pressure on the push-to-talk switch—or inflection control—while speaking, thus changing the pitch of his voice. For use by women talkers, the frequency range is adjusted to 200 to 400 cycles, to correspond with the normal range of pitch of a woman's voice.

A third transistor acts as a single-ended power output stage that amplifies the pulses applied to it from the relaxation oscillator. A diode serves to isolate the multivibrator from the power amplifier input impedance during the period between pulses, and is necessary for stable operation. Because a large pulse is required for sufficient acoustic power output at low frequencies, the relaxation oscillator drive circuit has heavy current requirements.

Two 5.2-volt mercury cells in series provide the power necessary to operate the artificial larynx continuously for a period of approximately 12 hours. These batteries have a 250-milliampere hour rating with a maximum permissible current drain of 25 milliamperes. With push-to-talk operation such as the laryngectomized patient requires, 12 hours of continuous operation should be equivalent to several days or even weeks of normal talking.

An alternative to using the self-contained mercury cells for powering the artificial larynx is a small a-c power supply which can be fed from a normal wall outlet at home or in the office. When the artificial larynx is plugged into the power supply, its batteries are disconnected from the circuit.

SIXTY-FOURTH ANNUAL MEETING

American Academy of Ophthalmology and Otolaryngology

OCTOBER 11 TO 16, 1959

PALMER HOUSE

Chicago, Illinois

OFFICIAL NOTICES

Convention Call

Under the authority of the Constitution and with the approval of the Council, I herewith proclaim that the Sixty-Third Annual Session of the American Academy of Ophthalmology and Otolaryngology will convene at the Palmer House, Chicago, Illinois, on Monday, October 12, 1959, at 9:30 a.m., and will continue through Friday, October 16, 1959.

JOHN H. DUNNINGTON, M.D.
President

Attest:

WILLIAM L. BENEDICT, M.D.
Executive Secretary-Treasurer

Business Meeting

The Annual Business Meeting of the Academy will be held in Private Dining Room 18 of the Palmer House on Thursday, October 15, 1959, at 5:30 p.m.

The Order of Business:

1. Call to order
2. Report of Executive Secretary-Treasurer
3. Report of the Senior Member of the Council
4. Election of Fellows
5. Election of Officers
6. Unfinished business
7. New business

All Fellows and candidates for election to Fellowship are urged to attend.

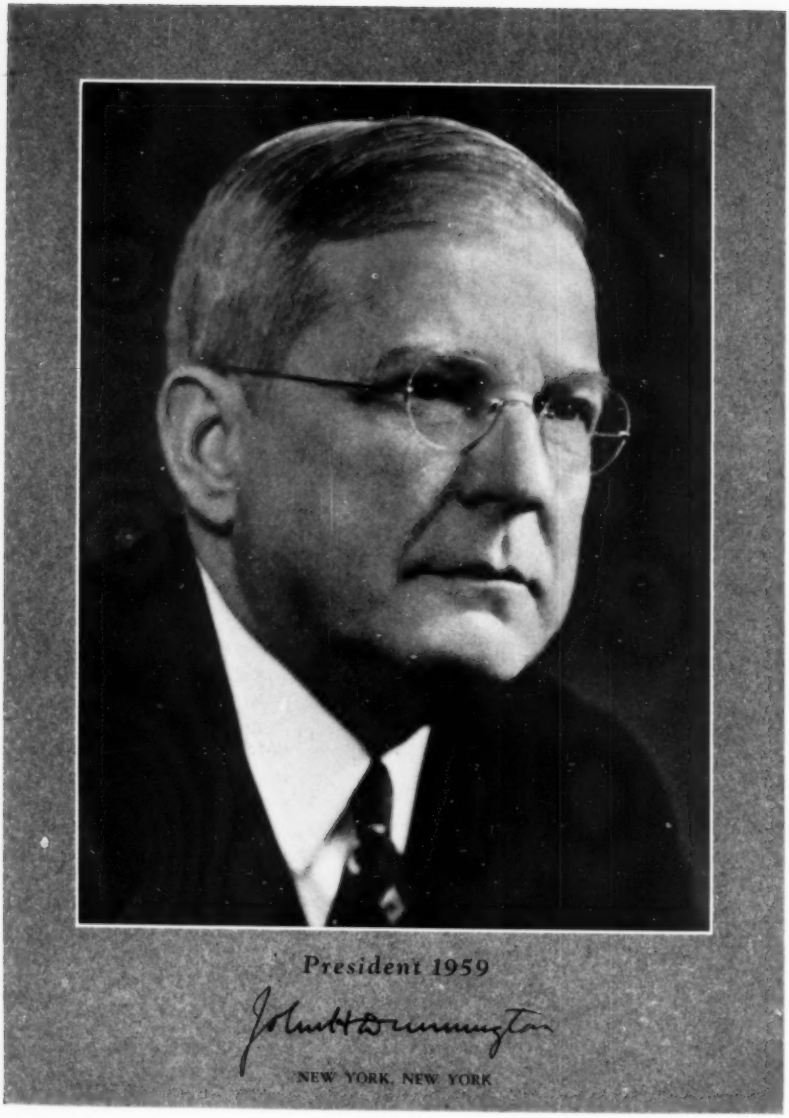
Council Meetings

The Council of the American Academy of Ophthalmology and Otolaryngology will convene at nine o'clock, Saturday morning, October 10, 1959, in Private Dining Room 4 of the Palmer House, Chicago. There will also be a meeting of the Council on Wednesday, October 14, at 12:45 p.m. in Private Dining Room 5. Members desiring to be heard or to present business will confer with the Executive Secretary-Treasurer for appointments.

JOHN H. DUNNINGTON, M.D.
President

New Business

Proposals for new activities often are presented too late during the Academy session to afford time for deliberation. Therefore, new items requiring Council



President 1959

NEW YORK, NEW YORK

Guest of Honor

GEORGIANA DVORAK THEOBALD, M.D.

EMERITUS CLINICAL PATHOLOGIST, ASSISTANT PROFESSOR
AND CONSULTANT IN PATHOLOGY,
UNIVERSITY OF ILLINOIS COLLEGE OF MEDICINE, CHICAGO

Degree as Doctor of Medicine from University of Illinois College of Medicine; intern, Women and Children's Hospital, Chicago; pathologist, Illinois Eye and Ear Infirmary; consultant to the American Board of Ophthalmology.

Life Fellow of the American Academy of Ophthalmology and Otolaryngology (Vice-President, 1952). Member of the American Ophthalmological Society, and of the Association for Research in Ophthalmology.

action should be presented in writing to the Executive Secretary-Treasurer early so that the Committee concerned may have an opportunity to study the matter prior to presentation to the Council.

Public Relations

Contributors to the scientific program are requested to send copies of their papers to the Secretary for Public Relations, Glen G. Gibson, M.D., 2031 Locust Street, Philadelphia 3, at the earliest possible moment.

Exhibits

The Scientific and Technical Exhibits will open at nine o'clock on Sunday morning, October 11. They will close at four o'clock Sunday afternoon for the President's Reception. From Monday through Friday they will open at 8:30 a.m. The Scientific Exhibit will close at 5:30 p.m. each day, and the Technical Exhibit at 5:00 p.m., except that they will both close on Friday, October 16, at twelve o'clock noon.

Dues

Receipt card for 1959 dues is required for registration at the Academy meeting. Those who have not paid dues for 1959 are requested to remit to W. L. Benedict, M.D., Executive Secretary-Treasurer, 15 Second Street S.W., Rochester, Minn. In case of loss, a duplicate receipt card may be obtained upon request.

Registration

General registration will begin at 8:15 a.m., Sunday, October 11, in the Foyer to the Grand Ballroom on the fourth floor of the Palmer House.

The regulation badge secured at the time of registration is essential for admittance to all activities. To facilitate registration the following sections will be provided:

Advance Orders: Members who have reserved instruction course tickets register here.

Members Without Advance Orders: Please present Receipt Card for 1959 dues. Dues outstanding may be paid at this section.

Instructors: All persons presenting instruction courses register here to secure special badge.

Nonmembers: A registration fee of $5.00 is required of all guests (see next page). The following exceptions are made:

1. Candidates for Academy Fellowship whose names appear in the July-August issue of the TRANSACTIONS.
2. Residents in training presenting guest cards obtained before the meeting (see next page).
3. Guest instructors.
4. Guests taking part in the Scientific Program or Exhibits.

Orthoptic Technicians: All orthoptic technicians register here. Tickets for the Orthoptic Technicians Instruction Courses will be on sale here.

Guests

Physicians who are not members are welcome to attend the meeting of the Academy as guests and to participate in all the activities. All guests, however, will be required to register, and a fee of $5.00 will be charged.

In the past, a number of Fellows and registered guests of the Academy have indicated that they wish their *office nurses, technicians,* and *similar personnel* to attend parts of the Academy program or exhibits. Such individuals will be allowed to register upon presentation of a written request from a Fellow or if accompanied by a registered guest or Fellow. The guest fee of $5.00 will be required. An exception is made for all members of the American Association of Orthoptic Technicians, who may register without fee.

Residents

Men in training in accepted residencies, or those now completing a full academic year (nine months) in basic study, may register without fee upon presentation of a guest card obtained by written request of their Department Heads.

Requests from Department Heads for guest cards should be sent to W. L. Benedict, M.D., 15 Second Street S.W., Rochester, Minn., by October 1.

Instruction Course Tickets

The tickets for courses in ophthalmology and the tickets for courses in otolaryngology and maxillofacial surgery will be sold at separate desks in the Registration area. Bulletin boards behind each desk will indicate what tickets are available. Please consult these boards in making your selections. Bear in mind that individual courses are for one hour only; continuous courses run for two or more hours. Price of tickets is $2.00 per hour.

It is necessary to register and to be wearing a regulation badge in order to purchase instruction course tickets.

Ladies' Registration

The wives of members and guests are urged to register at the Ladies' Headquarters on the eighth floor of the Palmer House, Room 832. Registration will open at nine o'clock, Sunday morning, October 11, and will close Wednesday evening, October 14.

CONVENTION ACTIVITIES

PRESIDENT'S RECEPTION

Grand Ballroom

Sunday, 4:30 p.m.

President John H. Dunnington and Mrs. Dunnington invite all members and guests of the Academy to a reception on Sunday, October 11, at 4:30 p.m. in the Grand Ballroom.

XVI JACKSON MEMORIAL LECTURE

Sponsored by the Ophthalmic Publishing Co.

Professor Doctor Jules Francois of the Department of Ophthalmology of the University of Ghent, Belgium, and an Honorary Fellow of the Academy, will deliver the XVI Jackson Memorial Lecture at the scientific session of the Section on Ophthalmology, Wednesday morning, October 14. The subject of his lecture will be "Syndromes with Congenital Cataract."

XV WHERRY MEMORIAL LECTURE

Sponsored by the Wherry Memorial Fund

The XV Wherry Memorial Lecture will be delivered at the scientific session of the Section on Otolaryngology, Wednesday afternoon, October 14, by Dr. James Hoyt Maxwell, Professor of Otolaryngology at the University of Michigan Medical School, Ann Arbor. His subject will be "Chronic Lympho-Epithelial Sialadenopathy."

THE ANNUAL BANQUET

Grand Ballroom

Monday, 7:00 p.m.

The attendance at the annual banquet last year was greater than for several years past and it was attributed to the good food and good entertainment at less than night club prices.

Doors open at 6:30 p.m. Bar service will be available. Dress optional.

Tickets will be on sale beginning Sunday morning at nine o'clock in the Registration Area. Tables may be reserved, ten places to a table. Sale will close at two o'clock Monday afternoon.

FACULTY LUNCHEON

Private Dining Room 14

Thursday, 12:30 p.m.

Members of the Instruction Courses Faculty, the Scientific Exhibitors, and authors and discussers on the Scientific Programs are invited to a Buffet Luncheon in Private Dining Room 14, Thursday at 12:30 p.m.

LADIES' PROGRAM

Wives and guests of members of the Academy are invited to participate in the special program of events planned for their pleasure and convenience by the Academy.

Coffee and rolls will be served daily from 10:30 to 11:30 a.m. and from 4:00 to 5:00 p.m. in the Ladies' Hospitality Suite, Rooms 832-834. On Sunday afternoon the coffee hour will be from three to four o'clock.

ALUMNI FUNCTIONS — 1959

The following alumni groups will hold dinners, luncheons, or cocktail parties during the Academy meeting. Most of these functions will be held on Wednesday evening, October 14, 1959. (A complete listing including time, place of function and address of the secretary for each group will appear in the Pocket Program issued at the Academy meeting.)

Brooklyn Eye and Ear Alumni Association

Dr. J. Mackenzie Brown Alumni

Buffalo Alumni

Cook County Hospital Ophthalmological and Otolaryngological Alumni

Henry Ford Hospital Alumni

Gill Memorial Eye, Ear and Throat Hospital Alumni—Annual Spring Graduate Course

Grady Hospital—Emory Uuiversity Alumni

Harper Hospital Alumni

Heed Ophthalmic Foundation Alumni

Illinois Eye and Ear Infirmary Alumni—Ophthalmology

Indiana Alumni and Staff

Iowa Eye, Ear, Nose and Throat Alumni

David H. Jones Alumni

Dr. Arlington C. Krause Luncheon

Dr. John R. Lindsay Alumni

Manhattan Eye, Ear and Throat Hospital—Society of Ex-House Surgeons

William A. Mann Ophthalmological Alumni of V. A. Hines

Massachusetts Eye and Ear Infirmary and Harvard Medical School Alumni

Mayo Clinic Alumni

Michael Reese Hospital Alumni

Mount Sinai Hospital of New York—Otolaryngology Alumni

Newark Eye and Ear Infirmary Alumni

New York Eye and Ear Infirmary Alumni

New York Hospital Alumni Group—Ophthalmology

New York University, New York Post Graduate Medical School and Bellevue Hospital Alumni

Northwestern University Alumni, Postgraduates, Residents and Staff

Walter R. Parker-Roy Bishop Canfield Alumni

Presbyterian Hospital of New York Ear, Nose and Throat Alumni

Receiving Hospital Ophthalmic Alumni (Detroit)

University of Illinois Otolaryngologic Alumni Association

University of Pennsylvania Post Graduate—Ophthalmology

University of Pennsylvania Alumni—Otolaryngology

Washington University Alumni—Ophthalmology

Washington University Alumni—Otolaryngology

Wills Eye Hospital Society Alumni

Wisconsin Eye, Ear, Nose and Throat Alumni

Tickets for alumni functions on Wednesday evening will be on sale from Sunday morning at nine o'clock until two o'clock on Wednesday.

PAN AMERICAN

Tickets for the Pan-American Association of Ophthalmology's Fiesta Panamericana will be on sale at the Pan-American desk from Sunday morning at nine o'clock until Thursday at two o'clock.

PAN AMERICAN
OTOLARYNGOLOGICAL BANQUET
Thursday, October 15, Crystal Room
6:30 p.m.
Subscription, Ten Dollars
Ladies invited

CANDIDATES--1959

The following candidates have applied for Fellowship in the American Academy of Ophthalmology and Otolaryngology and will be voted upon at the Annual Business Meeting, Thursday, October 15, 1959. Objections to the election of a candidate must be filed with the Executive Secretary-Treasurer previous to Saturday, October 10, 1959.

CANDIDATES CERTIFICATED BY BOARDS

Ophthalmology (OP)
Otolaryngology (ALR)

Aiello, John Samuel, 926 E. McDowell Rd., Phoenix, Ariz., OP

Ainslie, Robert Brown, 30 S. Henry St., Madison 3, Wis., ALR

Alba, Anthony, 199 Bay State Rd., Boston 15, Mass., OP

Apt, Leonard, Wills Eye Hospital, Philadelphia 30, Pa., OP

Arnold, Godfrey Edward, 6 E. 79th St., New York 21, N.Y., ALR

Askren, Edward Leroy, Jr., 340 Boulevard N. E., Atlanta 12, Ga., OP

Austin, David Fletcher, 700 N. Michigan Ave., Chicago 11, Ill., ALR

Baldwin, William Grove, 601 Douglas St., Wenatchee, Wash., ALR

Ball, Donald Nelson, Professional Bldg., Princeton, W. Va., OALR

Balsis, Bernard A., 226 W. State St., Trenton 8, N. J., OP

Balyeat, Ray M., School of Aviation Medicine, Randolph AFB, Texas, OP

Barest, Herman David, 332 E. Main St., Mount Kisco, N. Y., OP

Barsky, David, 100 Oak St., Wyandotte, Mich., OP

Beaman, Thomas Carroll, San Jaun Clinic, Farmington, N. M., OP

Beatrous, William Phillip, 4440 Magnolia St., New Orleans 15, La., ALR

Bechtel, Edward Jackson, 419 N. Newport Blvd., Newport Beach, Calif., OP

Beekhuis, Gerardus Jan, 4216 Bedford, Detroit 24, Mich., ALR

Benda, Thomas James, 1370 Dodge St., Dubuque, Iowa, ALR

Benjamin, Kenneth Wells, 1419 Spruce St., Philadelphia 2, Pa., OP

Biber, Jakub Jan, 36 W. Winter St., Delaware, Ohio, ALR

Bisland, Theodore, 3707 Gaston Ave., Dallas 10, Texas, OP

Blackmon, Lyndell W., 1420 Lady St., Columbia 1, S. C., OP

Blanchard, Arthur James, 3100 W. Central Ave., Toledo 6, Ohio, ALR

Blaydes, James Elliott, Jr., 107 Federal St., Bluefield, W. Va., OP

Bohcali, Ara, 508 Benine Rd., Westbury, N. Y., ALR

Boudett, Daniel William, 40 San Mateo Dr., San Mateo, Calif., ALR

Braufman, Harvey S., 111 Church St., Ferguson (St. Louis), Mo., OP

Breneman, Fairfax V., 810 Lamar Ave., Paris, Texas, ALR

Brock, Charles Lee, U. S. Naval Hospital, Philadelphia 45, Pa., OP

Bronstein, Melvin, 27 Ludlow St., Yonkers, N. Y., OP

Brooks, James Maffett, 670 N. Michigan Ave., Chicago 11, Ill., ALR

Brown, William Charles, Eye Service, U. S. Army Hospital, Fort Ord, Calif., OP

Budoff, Benjamin Hyman, 115 N. Main St., Freeport, N. Y., ALR

Bullis, Richard Omri, Jr., 430 Monterey Ave., Los Gatos, Calif., OP

Burrows, Herbert Leonard, 8215 Van Nuys Blvd., Panorama City, Calif., OP

Cabitt, Henry Leo, 520 Beacon St., Boston 15, Mass., OP

Calnan, Arthur Francis, 534 Beacon St., Boston 15, Mass., OP

Campbell, Charles John, 635 W. 165th St., New York 32, N. Y., OP

Canciila, Michael Louis, 246 North St., Pittsfield, Mass., OP

Carroll, Michael E., 8000 S. Racine Ave., Chicago 20, Ill., OP

Carter, Vincent, Jr., 654 Madison Ave., New York 21, N. Y., OP

Casey, Dennis Anderson, 4022 Canal St., New Orleans 19, La., ALR

Chalfin, J. Eugene, 36 Plaza St., Brooklyn 38, N. Y., OP

Chamberlain, George Earle, 414 Mayer Bldg., Portland 5, Ore., ALR

Cheesman, Glee Warner, 7 Union St., Hornell, N.Y,, ALR

Chong, Harry Shiua, 535 E. Romie Lane, Salinas, Calif., ALR

Christensen, Earl William, 1221 S. Broadway, Lexington, Ky., ALR

Christensen, Robert Eugene, Rm. 929, 727 W. Seventh St., Los Angeles 17, Calif., OP

Clark, Randall Lee, 5040 USAF Hospital, APO 942, Seattle, Wash., OP

Clark, Spurgeon William, Jr., 502 Isabella St., Waycross, Ga., OP

Clough, Howard Kenneth, Lankenau Medical Bldg., Philadelphia 31, Pa., OP

Cooper, Jack Crawford, 836th Tac Hospital, Langley AFB, Va., OP

Cosgrove, James Francis, 390 Main St., Worchester 8, Mass., OP

Crampton, Henry Jerome, 125 Amesbury St., Lawrence, Mass., OP

Crisman, Homer Ronald, 208 Medical Dental Center, Missoula, Mont., OP

Cutler, William Miller, 648 N. Woodward, Birmingham, Mich., OP

Dabezies, Oliver Hippolyte, Walter Reed Army Hospital, Washington 12, D. C., OP

Dennis, Robert P., 1002 Gore Blvd., Lawton, Okla., OP

DeNote, Anthony Paul, 12700 W. Dixie Highway, North Miami 61, Fla., OP

Dersh, Jerome, 814th Medical Group, Westover AFB, Mass., OP

Dias, John Felisberto, Jr., 227 Union St., New Bedford, Mass., OALR

Does, Charles Wordsworth, 195 Thayer St., Providence 6, R. I., OP

Dong, Emma O., 535 E. Romie Lane, Salinas, Calif., OP

Donnelly, Joseph Cornelius, 7955 Castor Ave., Philadelphia 15, Pa., ALR

Doull, Arthur Ernest, 324 Spring Garden Rd., Halifax, N. S., Canada, OALR

Dowling, Joseph Leo, Jr., 207 Waterman St., Providence 6, R. I., OP

Doyle, Samuel Chamberlain, Hitchcock Clinic, Hanover, N. H., ALR

Dubroff, Seymour, 1737 H St. N. W., Washington 6, D. C., OP

Duggan, William Thomas, 2175 Hayes St., San Francisco 17, Calif., ALR

Dunn, Shepard Nash, 1718 Hampton St., Columbia, S. C., OP

Eastwood, Herbert Kendrick, Jr., Major (MC), 7373rd USAF Hospital, APO 10, New York, N. Y., ALR

Eliasoph, Ira Ingram, 35 E. 85th St., New York 28, N. Y., OP

Ellsworth, Robert Malcolm, 635 W. 165th St., New York 32, N. Y., OP

Engler, Carl H., 1930 Wilshire Blvd., Los Angeles 57, Calif., OP

Eubanks, William Lewis, 2929 Habersham Rd. N. W., Atlanta 5, Ga., OP

Eves, John Harold, Thayer Hospital, Waterville, Maine, ALR

Farish, Henry G., 13320 Riverside Dr., Sherman Oaks, Calif., OP

Farrell, George Raymond, 150 N. Center St., Reno, Nev., ALR

Faye, Eleanor Eaton, 121 E. 60th St., New York 22, N. Y., OP

Fernandez, Rafael O., 160 Ponce de Leon Ave., San Juan, Puerto Rico, OP

Fidler, Harry Earl, 103 Bayard St., New Brunswick, N. J., ALR

Fine, Ben Sion, A.F.I.P., Walter Reed Army Hospital Center, Washington 25, D. C., OP

Fornatto, Elio Joseph, 172 Schiller St., Elmhurst, Ill., ALR

Fossas, Rafael J., Miramar Ave., 706, Santurce, Puerto Rico, OP

Frame, Stuart Maurer, Jr., 216 Alexander St., Rochester 7, N. Y., ALR

Gans, Jack S., 1401 Reisterstown Rd., Baltimore 8, Md., OP

Genereux, Arthur George, 408 Canada Bldg., Saskatoon, Sask., Canada, OALR

Goldsmith, Robert Irwin, 527 E. Liberty, Ann Arbor, Mich., OP

Goldstein, Edward N., 940 Brooklyn Ave., Brooklyn 3, N. Y., ALR

Gorin, Edward Frederick, 841 W. San Bruno Ave., San Bruno, Calif., OP

Gozum, Ekrem, 123 Second Ave. S. E., Minot, N. D., ALR

Griffey, Louis Ernest, 53 W. Central St., Natick, Mass., ALR

Gruber, Ellis, 35 Chestnut St., Rochester 4, N. Y., OP

Gyorkey, Joseph, 758 N. Ogden Ave., Chicago 22, Ill., ALR

Haddad, Maurice, 213 Wallace S. Bldg., Tampa 2, Fla., ALR

Halle, Jules, 75 St. Louis St., Quebec 4, Que., Canada, OALR

Hamilton, Harvey Seaman, Suite 260, 403 Sixth St., New Westminster, B. C. Canada, OP

Hanna, Homer Harold, Capt. MC, Valley Forge Army Hospital, Box 76, Phoenixville, Pa., ALR

Hannon, John Francis, Qtrs. 203-A, U. S. Naval Hospital, Portsmouth, Va., OP

Harper, William Henry, Billings Clinic, P. O. Box 2555, Billings, Mont., OP

Harris, Ronald Blythe, 711 S. Jefferson St., Roanoke 10, Va., OP

Harrison, Elizabeth Quarles, 363 Queens Ave., London, Ont., Canada, OP

Hauser, Paul John, 636 Church St., Evanston, Ill., OP

Hertzog, Francis Carl, Jr., 800 Pine Ave., Long Beach 13, Calif., OP

Heyner, Conrad S., 3424 Oakman Blvd., Detroit 4, Mich., OP

Himes, Ralph Francis, Jr., 340 Central Trust Bldg., Altoona, Pa., OP

Hinton, Golden Sanders, 207 Watauga Ave., Johnson City, Tenn., OP

Holland, John Joseph, 511 Bondi Bldg., Galesburg, Ill., OP

Holland, Monte Gene, 1430 Tulane Ave., New Orleans 12, La., OP

Holowin, Joseph S., 1350 W. Seventh St., San Pedro, Calif., OP

Ianacone, Samuel J., 32 N. Goodman St., Rochester 7, N. Y., OP

Iglesias, Robert Garcia, 442 W. Lafayette, Tampa 6, Fla., ALR

Jackson, Andrew Henry, Meharry Medical College, Nashville 8, Tenn., OP

Jampel, Robert S., 450 Clarkson Ave., Brooklyn 3, N. Y., OP

Johnson, Ernest Anderson, 100-103 Medical Dental Bldg., Calgary, Alta., Canada, OP

Joseph, Alfred Louis, 39 N. Ohio Ave., Columbus 3, Ohio, OP

Kanofsky, F. J., 1734 State St., Santa Barbara, Calif., OP

Kantor, Theodore J., 264 Genesee St., Utica 2, N. Y., ALR

Katz, Irving M., 84-32 Midland Pkwy, Jamaica Estates 32, N. Y., OP

Kaufman, Ira H., 75 S. Middle Neck Rd., Great Neck, N. Y., OP

Kemp, Gordon B., Geisinger Memorial Hospital, Danville, Pa., OP

Kennedy, John Joseph, 1356 Union St., Schenectady 8, N. Y., OP

Kleckner, James Franklin, 3731 Stocker St., Los Angeles 8, Calif., OP

Kleinhandler, William W., 927 Park Ave., New York 28, N. Y., OP

Klika, Raymond Riggs, 16360 Broadway, Maple Heights, Ohio, OP

Knisely, Samuel Weaver, 1410 N. Second St., Harrisburg, Pa., OP

Kossner, Herbert Karl, 2100 Kincaid Way, Sacramento 25, Calif., ALR

Kratz, Robert Collin, 2508 Auburn Ave., Cincinnati 19, Ohio, ALR

Kwapy, Clemens Ralph, 208 E. Wisconsin Ave., Milwaukee 2, Wis., ALR

Ladenheim, Jacob, 505 S. Oak Park Ave., Oak Park, Ill., OP

Lange, Rollo DuBois, 1 S. Pinckney St., Madison 3, Wis., ALR

Lansche, Richard Kindell, 11th Field Hospital, APO 178, New York, N. Y., OP

LaSala, Anthony Mark, 851 Bushwick Ave., Brooklyn 21, N. Y., ALR

Laws, Harold Wyatt, 1509 Sherbrooke West, Montreal, Que., Canada, OP

Leek, Joseph Hugh, 205 W. Second St., Duluth 2, Minn., ALR

LeJeune, Francis Ernest, Jr., Ochsner Clinic, New Orleans 15, La., ALR

Ley, Albert P., 640 S. Kingshighway, St. Louis 10, Mo., OP

Liao, Chung Kuo, 13000 S. Maple Ave., Blue Island, Ill., OP

Lim, Sigdian S., Kings County Hospital, Brooklyn 3, N. Y., ALR

Lodge, John Hayes, 7815 Old Georgetown Rd., Bethesda 14, Md., OP

Longfellow, Don Woodward, Armed Forces Institute of Pathology, Washington 25, D. C., OP

Lorenz, Elmer Wilford, 7600 Carroll Ave., Takoma Park, Md., ALR

Lubowitz, Richard M., The Benson East, Jenkintown, Pa., OP

MacRae, Donald MacKay, 324 Spring Garden Rd., Halifax, N. S., Canada, OALR

Maestre, Federico J., 1502 Ponce de Leon Ave., Santurce, Puerto Rico, OP

Magian, Victor deCourcey, Winnipeg Clinic, Winnipeg, Man., Canada, ALR

Malec, Henry William, 3600 Forbes, Pittsburgh 13, Pa., OP

Malkoff, Jack, 1005 Belmont Ave., Youngstown 4, Ohio, ALR

Malloy, David J., 9215 W. Center St., Milwaukee 10, Wis., OP

Mancall, Irwin Tuch, 750 Main St., Hartford 3, Conn., OP

Mandler, George, 913 Webster St., Chillicothe, Mo., ALR

Mangahas, Cayetano P., 1930 Chestnut St., Philadelphia 3, Pa., OP

Marshall, James R., Jr., 20160 Mack Ave., Grosse Pointe 36, Mich., OP

Maynard, Robert Ensign, 215 Fourth Pl., Renton, Wash., OP

Mays, Joseph Lamar, 1029 Candler Bldg., Atlanta 3, Ga., OP

McCoy, R. Hall, 1374 Sherbrooke St. West, Montreal 25, Que., Canada, ALR

McLean, Richard K., 119 N. Imperial, El Centro, Calif., OP

McNicholas, Patrick John, 288 Duckworth St., St. John's, Nfld., Canada, OP

McNichols, William Arthur, Jr., 101 First St., Dixon, Ill., OP

Meyers, Marina Prajmovsky, 13 Walnut Rd., Glen Cove, N. Y., OP

Michaile, Kenneth Isadore, 1930 Chestnut St., Philadelphia 3, Pa., OP

Milam, Daniel Franklin, Jr., 27 103rd Ave., Bellevue, Wash., OP

Mirabile, Thomas J., 59 Burnside Ave., East Hartford 8, Conn., OP

Montalvo, Andres, Professional Bldg., Santurce, Puerto Rico, OP

Moose, Ray M., 575 Fifth St., San Bernardino, Calif., ALR

Moraitis, Constantine Z., 4127 Brownsville Rd., Pittsburgh 27, Pa., OP

Nachod, Grace Rebecca, 5501 Greene St., Philadelphia 44, Pa., OP

Nito, Yuichi, University of Tennessee, Memphis, Tenn., ALR

Nousek, James Edward, Jr., 2020 E. 93rd St., Cleveland 6, Ohio, OP

Ocasio Cabanas, Kermell A., 353 De Diego Ave., Santurce, Puerto Rico, OP

O'Neill, James Flemister, 511 11th St. North, St. Petersburg, Fla., OP

Parsons, Hugh Earle, 442 W. Lafayette St., Tampa 6, Fla., OP

Parsons, Richard Clare, Grady Hospital, Atlanta 3, Ga., ALR

Pasek, Edward Antone, 1600 S. Western Ave., Sioux Falls, S. D., OP

Patchett, Orval Wilson, 712 N. Fourth St., Pasco, Wash., OALR

Pate, John Wilson, 55 E. North St., Madisonville, Ky., OP

Pearlman, Edwin, 910 Wainwright Bldg., Norfolk 10, Va., OP

Peretz, Walter Leon, 1224 Clinton Ave., Irvington, N. J., OP

Pernoud, Michael Frank, 634 N. Grand Ave., St. Louis 3, Mo., OP

Perreten, Frank Arnold, 209 Reynolds Bldg., Winston-Salem, N. C., OP

Perry, Judith V., 830 W. Eighth St., Hinsdale, Ill., OP

Phillips, Roland LaVerne, 403 Matthews Bldg., Owosso, Mich., OP

Pincus, Morris Herbert, 881 Washington Ave., Brooklyn 25, N. Y., OP

Pinsker, Oscar T., 701 E. 63rd St., Kansas City, Mo., ALR

Post, Jarvis Harold, 345 Vine St., Johnstown, Pa., OP

Quinn, James Henry, 804 Boston Bldg., Salt Lake City, Utah, OP

Raban, Reginald James, 227 S. Sixth St., Camden 3, N. J., OP

Rados, Walter T., 31 Lincoln Park, Newwark 2, N. J., OP

Radpour, Shokri, State University of New York, Brooklyn 3, N. Y., ALR

Raggio, Thomas P., Reymond Bldg., Baton Rouge, La., ALR

Rankin, Richard Brandon, Jr., Cabarrus Bank Bldg., Concord, N. C., OP

Razim, Edward Anton, 6804 Windsor Ave., Berwyn, Ill., ALR

Reichert, Clifford F., 132 Union Ave., Framingham, Mass., OP

Rhodes, David Henry, Jr., 7013 Jenkins Arcade, Pittsburgh 22, Pa., OP

Rice, Jacob, 114 Waltham St., Lexington 73, Mass., OP

Rice, Lee Edward, 2141 14th St., Boulder, Colo., OP

Rife, Charles Jacob, 716 N. Lime St., Lancaster, Pa., OP

Roberts, Shaler Sinclair, Jr., 416 N. Seminary St., Florence, Ala., OP

Robinson, Mendell, 206 Waterman St., Providence 6, R. I., ALR

Roe, Chester Thomas, Professional Bldg., 1221 E. State St., Rockford, Ill., OP

Rolfes, Harry Franklin, 148 First St. North, St. Petersburg 1, Fla., OP

Rowe, Fred Anderson, Jr., 340 Doctors Bldg., Nashville 3, Tenn., OP

Rup, Edmund Charles, 85 Jefferson St., Hartford 14, Conn., OP

Sabin, Frederick Chapman, 101 S. Front St., Marquette, Mich., OP

Sallee, William Thomas, USAF School of Aviation Medicine, Randolph AFB, Texas, OP

Salmon, Louis R., 1008 N. Main St., Bloomington, Ill., OP

Sandler, Robert, 818 Medical Arts Bldg., Baltimore 1, Md., OP

Schwade, Irwin, 250 W. 21st St., New York 11, N. Y., OP

Senita, George Robert, 198 Lincoln Ave., Pittsburgh 2, Pa., OP

Shekter, William B., 2425 Geary Blvd., San Francisco, Calif., OP

Shrader, Edward Charles, 1406 Heyburn Bldg., Louisville 2, Ky., OP

Silver, Abraham Gilbert, 30 E. 60th St., New York 22, N. Y., ALR

Simpson, Roger Allen, 319 E. Bloomington St., Iowa City, Iowa, ALR

Smith, Howard Willis, 442 Temple St., New Haven 10, Conn., ALR

Smith, Joseph Lawton, Wilmer Institute, Johns Hopkins Hospital, Baltimore 5, Md., OP

Smith, William Arthur, 3166 Maple Dr. N. E., Atlanta 5, Ga., OP

Smith, William Orlando, 327 Utica Square Medical Center, Tulsa, Okla., ALR

Sofranec, James Richard, 208 Mahoning Bank Bldg., Youngstown, Ohio, ALR

Sonnier, William, Jr., 1458 S. College Rd., Lafayette, La., OP

Sophocles, Aris M., 224 W. State St., Trenton 8, N. J., ALR

Sozanski, Julius C., 77 Broad St., Lynn, Mass., OP

Spencer, William Howard, 490 Post St., San Francisco 8, Calif., OP

Stein, Harold A., 329 Bloor St. West, Toronto 5, Ont., Canada, OP

Stevenson, Roger, U. S. Naval Hospital, Corpus Christi, Texas, OP

Stokes, James Arthur, Martin Army Hospital, Fort Benning, Ga., OP

Stone, Howard H., 416 N. Bedford Dr., Beverly Hills, Calif., OP

Straatsma, Bradley Ralph, U.C.L.A. Medical Center, Los Angeles 24, Calif., OP

Stratford, Thomas P., 200 Medical Arts Bldg., Richmond 19, Va., OP

Strow, Wallace F., 520 E. Allen, Springfield, Ill., OP

Summar, Marion Thomas, East Range Clinic, Virginia, Minn., ALR

Tatar, Joseph, 1893 Sheridan Rd., Highland Park, Ill., OP

Taylor, Irvin S., 62 S. Highland Ave., Ossining, N. Y., OP

Tenzel, Richard Ruvin, 210 E. 64th St., New York 21, N. Y., OP

Tetlie, James P., 628 Medical Arts Bldg., Duluth 2, Minn., OP

Thorn, James Isham, U. S. Naval Hospital, Philadelphia 45, Pa., OP

Ticho, Karl E., 4817 W. 83rd St., Oak Lawn, Ill., OP

Touma, Alfred, 735 S. Washington St., Royal Oak, Mich., OP

Trachtenberg, Lee Hersh, 112 Rimbach, Hammond, Ind., OP

Traganza, Robert W., 236 White Horse Pike, West Collingswood 6, N. J., OP

Trotter, Robert R., 243 Charles St., Boston 14, Mass., OP

Tucker, Gabriel Frederick, Jr., Johns Hopkins Hospital, Baltimore 5, Md., ALR

Turnbull, Don C., 501 Woodward Bldg., Birmingham 3, Ala., OP

Twichell, Gilbert A., USAF Hospital, Maxwell AFB, Montgomery, Ala., ALR

Valusek, Fred Anthony, U. S. Naval Hospital, Qtrs. F-21, Philadelphia 45, Pa., ALR

Veenis, Cornelius Y., 4627 Fifth Ave., Pittsburgh 13, Pa., OP

Vermes, Edmund, 625 Park Ave., New York 21, N. Y., ALR

Walthall, Joseph Emmett, III, 1673 W. Broadway, Anaheim, Calif., ALR

Watzke, Robert Coit, Dept. of Ophthalmology, University Hospitals, Iowa City, Iowa, OP

Welch, Robert Bond, Wilmer Institute, Johns Hopkins Hospital, Baltimore 5, Md., OP

Whitaker, Clay W., 10515 Carnegie Ave., Cleveland 6, Ohio, ALR

White, John James, 653 W. State St., Jackson 2, Miss., OP

Whitehead, David C., 1306 Colonial Ave., Norfolk 7, Va., OP

Whitfield, Stanley, Box 328, Presbyterian Hospital, New York 32, N. Y., ALR

Wiedman, Michael S., 9 Central St., Lowell, Mass., OP

Williams, James Arthur, 2628 El Camino Ave., Sacramento 21, Calif., ALR

Willoughby, William Allen, 974 Fisher Bldg., Detroit 2, Mich., OP

Yancey, William Albert, 233 A St., San Diego 1, Calif., OP

Yasuna, Jules M., 1020 Main St., Peekskill, N. Y., OP

Yatzkan, David N., 816 Ann St., Homestead, Pa., OP

Zamora, Pablo J., Tripler U. S. Army Hospital, APO 438, San Francisco, Calif., OP

Zavatsky, Albert Richard, 100 State St., Harrisburg, Pa., ALR

Zuckerman, Bernard D., 255 Bradley St., New Haven 10, Conn., OP

The following candidates have qualified for Fellowship in the Academy except in some single detail, such as certification of the signatures of sponsors. The deficiencies are expected to be made up before the Annual Business Meeting.

Baldone, Joseph Anthony, 211 S. Saratoga St., New Orleans 12, La., OP

Cohen, Abraham Albert, 130 E. 67th St., New York 21, N. Y., ALR

Consul, Bishan Nath, Sawai Man Sing Medical College, Jaipur, Rajasthan, India, OP

Grandon, Eugene Leonard, University Hospitals, Iowa City, Iowa, OP

Grom, Edward, Instituto Medico del Este, Ave. Casanova, Caracas, Venezuela, OP

O'Mahony, John B., 327 N. Christina St., Sarnia, Ont., Canada ALR

Tonndorf, Juergen, Medical Research Center, Room 11, Iowa City, Iowa, ALR

Valcarce, Joaquin, 3970 USAF Hospital, APO 283, New York, N. Y., OP

TECHNIQUE WITH THE FRESH TEMPORAL BONE

Arrangements have been made with the Department of Medical Motion Pictures and Television of the American Medical Association to take over the distribution of the motion picture "Technique with the Fresh Temporal Bone" produced by Dr. Harold F. Schuknecht. The film may be obtained by writing to:

Motion Picture Library
American Medical Association
535 North Dearborn Street
Chicago 10, Illinois

PROGRAM IN BRIEF

Palmer House — Chicago

1959 Meeting

SATURDAY, OCTOBER 10

9:00 a.m.—Council Meeting—Private Dining Room 4

SUNDAY, OCTOBER 11

8:15 a.m. — Registration — Foyer to Grand Ballroom

9:00 a.m. — Ladies' Registration—Room 832

9:00 a.m.—Official Opening of Exhibits: Scientific—Private Dining Rooms 15, 16, 17; Club Foyer
Technical—Exhibition Hall and Red Lacquer Room, and Seventh Floor

9:00 a.m.—Teachers' Sections: Ophthalmology and Otolaryngology Combined—Grand Ballroom

12:30 p.m.—Home Study Faculty Luncheon—Private Dining Room 9

4:30 p.m. — President's Reception — Grand Ballroom

8:00 p.m.—Special Scientific Program: Otosclerosis Study Group of the Committee on Conservation of Hearing—Grand Ballroom

8:00 p.m.—Special Scientific Program: American Orthoptic Council and American Association of Orthoptic Technicians—Waldorf Room, Conrad Hilton Hotel

MONDAY, OCTOBER 12

9:00 a.m.—Orthoptic Technicians Instruction Courses—Seventh Floor

9:30 a.m.—Joint Scientific Session—Grand Ballroom

10:15 a.m.—Orthoptic Technicians Instruction Courses—Seventh Floor

11:30 a.m.—Orthoptic Technicians Instruction Courses—Seventh Floor

2:00 p.m.—Section on Otolaryngology: Scientific Papers and Motion Pictures—Grand Ballroom

2:00 p.m.—EYE Instruction Courses—Seventh Floor and Crystal Room

3:15 p.m.—EYE Instruction Courses—Seventh Floor and Crystal Room

4:30 p.m.—EYE Instruction Courses—Seventh Floor and Crystal Room

7:00 p.m.—Annual Banquet—Grand Ballroom

TUESDAY, OCTOBER 13

9:00 a.m.—Section on Ophthalmology: Scientific Papers and Motion Pictures—Grand Ballroom

9:00 a.m.—ENT Instruction Courses—Seventh Floor and Crystal Room

9:00 a.m.—Orthoptic Technicians Instruction Courses—Seventh Floor

10:15 a.m.—ENT Instruction Courses—Seventh Floor

10:15 a.m.—Orthoptic Technicians Instruction Courses—Seventh Floor

11:30 a.m.—ENT Instruction Courses—Seventh Floor

11:30 a.m.—Orthoptic Technicians Instruction Courses—Seventh Floor

2:00 p.m.—Section on Otolaryngology: Scientific Papers and Motion Pictures—Grand Ballroom

2:00 p.m.—EYE Instruction Courses—Seventh Floor and Crystal Room

3:15 p.m.—EYE Instruction Courses—Seventh Floor and Crystal Room

4:30 p.m.—EYE Instruction Courses—Seventh Floor and Crystal Room

5:30 p.m.—Dinner Meeting of International Association of Secretaries of Ophthalmological and Otolaryngological Societies—Private Room 18

8:00 p.m.—Special Scientific Program: Committee on Plasitc Surgery, Ophthalmology—Grand Ballroom

8:00 p.m.—Special Scientific Program: Committee on Plastic Surgery, Otolaryngology—Crystal Room

WEDNESDAY, OCTOBER 14

9:00 a.m.—Section on Ophthalmology: Scientific Papers and Motion Pictures—Grand Ballroom

9:00 a.m.—ENT Instruction Courses—Seventh Floor and Crystal Room

10:15 a.m.—ENT Instruction Courses—Seventh Floor

11:30 a.m.—ENT Instruction Courses—Seventh Floor and Crystal Room

12:45 p.m.—Council Meeting Luncheon—Private Dining Room 5

2:00 p.m.—Section on Otolaryngology: Scientific Papers and Motion Pictures—Grand Ballroom

2:00 p.m.—EYE Instruction Courses—Seventh Floor and Crystal Room

3:15 p.m.—EYE Instruction Courses—Seventh Floor and Crystal Room

4:30 p.m.—EYE Instruction Courses—Seventh Floor and Crystal Room

6:30 p.m.—Alumni Functions, unless otherwise noted

THURSDAY, OCTOBER 15

9:00 a.m.—Section on Ophthalmology: Scientific Papers and Motion Pictures—Grand Ballroom

9:00 a.m.—ENT Instruction Courses—Seventh Floor

10:15 a.m.—ENT Instruction Courses—Seventh Floor

11:30 a.m.—ENT Instruction Courses—Seventh Floor

12:30 p.m.—Faculty Buffet Luncheon—Private Dining Room 14

2:00 p.m.—Section on Otolaryngology: Scientific Papers and Motion Pictures—Grand Ballroom

2:00 p.m.—EYE Instruction Courses—Seventh Floor

3:15 p.m.—EYE Instruction Courses—Seventh Floor

4:30 p.m.—EYE Instruction Courses—Seventh Floor

5:30 p.m.—Business Meeting—Private Dining Room 18

FRIDAY, OCTOBER 16

8:45 a.m.—American Society of Ophthalmologic and Otolaryngologic Allergy—Private Dining Room 14

9:00 a.m.—Section on Ophthalmology: Scientific Papers and Motion Pictures—Grand Ballroom

RESERVE YOUR TABLE FOR THE ANNUAL BANQUET

All tables reserved. Tickets are on sale in the registration foyer. Excellent cuisine. THREE ACTS OF DELIGHTFUL ENTERTAINMENT. Get your tickets and choose your table. Make up your party and meet early for cocktail service in the banquet hall. Doors open at 6:30 p.m., banquet at 7:30 p.m. Dancing to follow, ten to twelve — NORM KRONE and his orchestra.

SCIENTIFIC SECTIONS

JOINT SESSION

Monday, October 12, 1959

9:30 a.m.

GRAND BALLROOM

Presiding Officer:

JOHN H. DUNNINGTON, M.D.
President

Secretary:
KENNETH L. ROPER, M.D.

Call to Order.....The President

Announcements

Introduction of the Guest of Hon. Georgiana Dvorak Theobald, M.D.
Oak Park, Illinois

Address by the President
Interdependence

Address by the Guest of Honor
Women and Medicine

Presentation of Honor Awards

RECIPIENTS OF HONOR AWARDS FOR 1959

Henry F. Allen
Boston

Bennett Y. Alvis
St. Louis

Oscar J. Becker
Chicago

Richard J. Bellucci
New York

Victor A. Byrnes
St. Petersburg, Florida

Norton Canfield
New Haven, Connecticut

J. Vernal Cassady
South Bend, Indiana

Bernard C. Gettes
Philadelphia

Joseph L. Goldman
New York

Edgar M. Holmes
Boston

Charles E. Iliff
Baltimore

Raymond E. Jordan
Pittsburgh

Samuel J. Kimura
Berkeley, California

Abraham L. Kornzweig
New York

Alfred J. Kreft
Portland, Oregon

Albert N. Lemoine, Jr.
Kansas City, Missouri

John M. Masters
Indianapolis

Adolph Posner
New York

Harold F. Schuknecht
Detroit

Hans V. von Leden
Chicago

Walter P. Work
San Francisco

Proper Use of Tranquilizers

Emanuel M. Papper, M.D.
New York

BY INVITATION

A short resume of the major classes of tranquilizers in current usage will be presented. The characteristic pharmacologic actions will be described briefly insofar as they pertain to clinical application. The chief part of the presentation will be concerned with two aspects of the use of tranquilizers. The first of these is the patient who comes to operation and is treated with tranquilizers for medical or psychiatric problems not necessarily related to the surgical disease. The second

aspect of the discussion will be concerned with the use of tranquilizers in the preparation, management and postoperative care of the surgical patient. Consideration will be given to the side effects, dangers and advantages in the use of these drugs in connection with operation and anesthesia.

Proper Use of Antibiotics

George G. Jackson, M.D.
Chicago

BY INVITATION

For nearly fifteen years antibiotics have been generally available for application to the clinical practice of medicine. The proper use of these antibiotics has been a subject of extensive investigation and considerable deliberation. If the proper use could be defined in absolute terms, it would have been done, but the proper use of antibiotics includes relative indications, special situations, different evaluations, appreciation and expectations of individuals using and receiving the drugs. Failures in the proper use of antibiotics, therefore, are both human failures and antibiotic failures. The former relate to inadequate diagnosis, empirical treatment, misinterpretation of laboratory data, and insufficient knowledge about the specific antibiotics. Antibiotic failures occur in the realm of natural and acquired resistance of bacteria, inadequate bactericidal activity, difficulties in obtaining proper concentrations in the body fluids, and drug toxicity. The author's experience in some of these areas will be discussed in the lecture.

AUTHORS OF PAPERS

All slides or films must be in the hands of the projection operator before the opening of each session.

Please be prepared to submit papers to the recorder immediately following presentation.

SECTION ON OTOLARYNGOLOGY

Monday, October 12, 1959

2:00 p.m.

GRAND BALLROOM

Presiding Officer:
GORDON D. HOOPLE, M.D.
Vice-President

Secretary:
EUGENE L. DERLACKI, M.D.

Presentation of Awards by Committee on Research in Otolaryngology

RECIPIENTS OF AWARDS

Irving M. Blatt, M.D., Detroit, Michigan, for his clinical investigation of Secretory Sialography in Diseases of the Major Salivary Glands.

Stanley D. Greenberg, M.D., Beaumont, Texas, for his basic investigation of Tracheal Homografts in Dogs.

Brian F. McCabe, M.D., Ann Arbor, Michigan, for his basic investigation of The Effects of Intense Sound on the Nonauditory Labyrinth.

T. Manford McGee, M.D., Detroit, Michigan, for his basic investigation of Ototoxicity in Cats, Following Toxic Doses of Streptomycin.

2:05 p.m.

AN EXACT METHOD OF REMOVING SMALL LARYNGEAL LESIONS UNDER GENERAL ANESTHESIA
Robert E. Priest, M.D.
and
Stanley Wesolowski, M.D.

BY INVITATION

Minneapolis

Discussers:

Louis H. Clerf, M.D.
St. Petersburg, Florida

DeGraaf Woodman, M.D.
New York

This paper presents an exact technique for the removal of small laryngeal lesions under general anesthesia. A small endotracheal tube is introduced through the

larynx. This tube has a balloon on its outer surface at the distal end. The inflating tube for the balloon is incorporated into the side of the endotracheal tube itself so that it does not hinder the operator as he works in the larynx. The tube is small enough to lie posterior to most laryngeal lesions. Anesthesia is induced by using intravenous pentobarbital (sodium pentothal) and a muscle relaxant. The patient's breathing can be controlled through the closed system described above.

A special small laryngostat modified from Dr. Broyles' wasp-waisted anterior commissure laryngoscope is used to expose the tumor. This instrument is small enough to fit into the larynx anterior to the endotracheal tube without crowding.

It is slipped down between the false vocal cords in the usual manner, and the true cords are tensed by lifting the instrument forward so that the edges of the cords are clearly defined. The lesion is then removed with cup biting forceps of the Jackson type.

Originality for this method is not claimed by the authors. However, in many sections of the country, removal of lesions of this type is carried out under local anesthesia. In some instances this is an uncomfortable process for the patient, as well as a difficult procedure for the physician. In the method described above and used by the authors and many other physicians around Minneapolis for the last fifteen years, it is possible to carry out this surgical procedure in complete comfort for the patient, and in most instances in a very easy and comfortable manner for the operator. Results of such removals have been excellent, with few complications or recurrences of benign lesions due to inadequate removal.

2:35 p.m.

VESTIBULAR SUPPRESSION IN FIGURE SKATERS

(A Motion Picture)

Brian F. McCabe, M.D.

Ann Arbor, Michigan

BY INVITATION

Figure skaters avoid such sequelae of prolonged rapid rotation as vertigo, nystagmus, and disorientation with the same facility as ballet dancers. Moreover, they spin at a much more rapid rate, approaching five revolutions per second. Ballet dancers utilize a trick called "spotting" to avoid postrotatory vertigo. Films with sequences shot at 16 and 400 frames per second demonstrate that figure skaters do not spot or use any other discernible trick to avoid vestibular irritation.

This ability of figure skaters is due to either adaptation, fatigue, or suppression. Consideration is given to each, and evidence seems to point to central nervous system suppression as the most reasonable mechanism. The development of vestibular suppression is watched in several young subjects under training by a professional figure skater. Suppression is developed fairly rapidly and seems to be reversible.

3:05 p.m.

ANATOMIC STUDIES RELATED TO CANCER OF THE LARYNX

Joel J. Pressman, M.D.
and
Mildred Burtz Simon

BY INVITATION

Charles M. Monell, M.D.

BY INVITATION

Los Angeles

This is a combined laboratory and clinical study which attempted to correlate the results of certain laboratory experiments with clinical observations related to the behavior of cancer of the larynx. The laboratory studies reflect the natural history of the spread of carcinoma of the larynx so that experimental findings can be used to predict the future distribution and route of spread of a given lesion. The spread of fluids injected into the larynx tends to be limited by anatomic compartmentation, which has been described previously. The lymphatic flow in general corresponds to the pattern of the compartments. Escape of tumors by lymphatic routes from the larynx likewise follows definite predictable patterns which can be demonstrated experimentally and shown to correspond with observed phenomena.

By the application of these studies a logical conclusion can be drawn concerning the problem of total vs. partial laryngectomy. It is believed that the studies will justify less frequent use of total laryngectomy, and provide a sound basis for the type of operation selected.

Examples of surgical specimens corresponding to the experiments performed and demonstrating the various routes of spread of cancer within the larynx and to the neighboring lymphatics will be shown.

3:35 p.m.

FAMILIAL HEMORRHAGIC TELANGIECTASIA, SEPTAL PERFORATIONS: A NEW SURGICAL TREATMENT

(Includes Motion Picture)

William H. Saunders, M.D.
Columbus, Ohio

Discusser:
Oscar Becker, M.D.
Chicago

This paper describes a new operation that eliminates the hemorrhages of patients with familial hemorrhagic telangiectasia. Such patients suffer lifelong debilitating nosebleeds. Treatment for their condition, either medical or surgical, has never been satisfactory.

The same operative procedure can also be used to close virtually any septal perforation. Nasal septal perforations usually cause no symptoms, but sometimes the edges of a perforation crust and bleed again and again. The numerous plastic procedures devised for septal perforations are occasionally successful when used to close small holes. Large perforations, however, are seldom, if ever, closed.

The author's experiences with 15 patients are described. A motion picture in color illustrates the exact surgical technique.

3:55 p.m.

AN EVALUATION OF THE RAMBO PRIMARY CLOSURE OF THE RADICAL MASTOIDECTOMY WOUND

Milo H. Fritz, M.D.
and
Glenn Crawford, M.D.

BY INVITATION

Anchorage, Alaska

Discusser:
J. H. Thomas Rambo, M.D.
New York

It is now possible for a meticulous otologist to perform an endaural subcortical mastoidotympanectomy (radical mastoid operation) and assure his patient that his ear will be completely dry one month from the day of operation. No longer must he suggest the advisability of operation to prevent unlikely dangerous intracranial extensions while avoiding assurance to the patient that he will be relieved of discharge completely and permanently and that he will be able to swim, shampoo his hair, and catch a common cold without recurrence of aural discharge.

The technique for accomplishing this result was first described by Rambo.

Here 50 cases of unilateral chronic mastoiditis done by the same surgeon are presented. In 25 cases the Lempert radical mastoid operation resulted in 8 cases failing to heal in 88 to 547 days of observation. In the next 25 consecutive cases, by adding the Rambo pedicled temporalis muscle graft and primary closure, all patients were completely well, dry, and healed in 7 to 42 days.

Modifications of the Rambo technique are described and illustrated. Detailed statistical analysis is made.

4:25 p.m.

THE ROLE OF THE OTOLARYNGOLOGIST IN BRONCHOESOPHAGOLOGY

(Includes Motion Picture)

Paul H. Holinger, M.D.

Kenneth C. Johnston, M.D.
Chicago

The field of bronchoesophagology was originally developed by otolaryngologists who extended their examinations to the air and food passages through the development of endoscopic instruments. As advances in medical and surgical concepts of diseases of the chest unfolded, the importance and effectiveness of the peroral endoscopist increased proportionately. Otolaryngologists, through training in monocular vision and manual dexterity with small instruments, retain an advantage in the management of endoscopic problems. Thus, an interesting stimulating field in bronchoesophagology remains open to the otolaryngologist who retains an interest in the general medical aspects of respiratory obstruction and of bronchopulmonary and esophageal diseases.

A review of statistics of an endoscopic clinic will illustrate the variety and frequency of problems which are the responsibility of the otolaryngologist. These include the management of respiratory and esophageal obstruction in infants, endoscopic laryngeal surgery, therapeutic endoscopic procedures of the tracheobronchial tree and esophagus of adults. These areas are, for the most part, untouched by surgeons and internists interested in diagnostic endoscopy. Organizational setup, endoscopic techniques and training and teaching programs in bronchoesophagology will be discussed.

SECTION ON OPHTHALMOLOGY

Tuesday, October 13, 1959

9:00 a.m.

GRAND BALLROOM

Presiding Officer:

S. RODMAN IRVINE, M.D.
Vice-President

Secretary:
KENNETH L. ROPER, M.D.

MYCOSIS FUNGOIDES WITH OCULAR INVOLVEMENT

(A Clinicopathologic Case Report)

Helenor Campbell (Wilder) Foerster
San Francisco

Mycosis fungoides is a malignant dermatosis which becomes neoplastic in character only in its late stages. The reticuloendothelial origin of the tumor cells has led to the disease being classed with the lymphomas.

The case to be presented is that of a 59-year-old white man who developed mycosis fungoides with multiple skin lesions fourteen years before enucleation of his left eye, but the disease did not enter the tumor phase until one year before enucleation. He received large amounts of roentgen treatment over a period of ten years and had three courses of electron beam therapy.

Twenty-two years before enucleation the patient had suffered a severe contusion to his left eye. Vision was reduced but the eye remained quiet until a year before enucleation, when he noticed floaters and visual blur. Examination revealed vitreous opacities, cells in the anterior chamber and small keratic precipitates. Treatment consisted of corticosteroid drops and scopolamine, but a mature cataract developed and the eye became painful. It was enucleated following a clinical diagnosis of post-traumatic uveitis, although the possibility of association with his skin disease was considered. Intraocular involvement in mycosis fungoides was evident on microscopic examination.

9:10 a.m.

CINEMATOGRAPHY OF HUMAN RETINAL VESSELS

(A Motion Picture)

Kenneth C. Swan, M.D.
and
Paul Bailey, Jr., M.D.

BY INVITATION

Portland, Oregon

Morphologic changes which occur in the retinal vessels have been well documented by ophthalmoscopic and photographic studies. In contrast, functional changes have received little attention. Recent advances in the field of vascular disease, notably in vascular surgery, have stimulated new interest and have given new diagnostic significance to functional changes such as alterations in the character of pulsations of the retinal vessels. Cinematography provides a means of recording and studying these pulsations and the movement of blood through the retinal vessels under high magnification, but technical difficulties have limited use of this technique. A practical camera for cinematography of the fundus has been designed at the University of Oregon Medical School. Films will be shown to demonstrate some normal and abnormal variations in the retinal and venous pulsations and to call attention to the segmental shifting of the blood vessels which occurs in certain types of angiosclerosis.

9:30 a.m.

SYMPOSIUM: OFFICE MANAGEMENT OF THE PRIMARY GLAUCOMAS

1. *Introduction*
   F. Bruce Fralick, M.D., Moderator
   Ann Arbor, Michigan
2. *History, Signs and Symptoms of the Glaucomas*
   George M. Haik, M.D.
   New Orleans
3. *Gonioscopy, Visual Fields, Slit Lamp and Fundus in the Diagnosis of the Glaucomas*
   Robert N. Shaffer, M.D.
   San Francisco
4. *Tonometry, Tonography and Provocative Tests in the Management of the Glaucomas*
   Bernard Becker, M.D.
   St. Louis
5. *Medical Therapy of the Glaucomas*
   W. Howard Morrison, M.D.
   Omaha

SECTION ON OTOLARYNGOLOGY

Tuesday, October 13, 1959

2:00 p.m.

GRAND BALLROOM

Presiding Officer:
LYLE M. SELLERS, M.D.
Vice-President

Secretary:
EUGENE L. DERLACKI, M.D.

THE VESTIBULOGRAM: A GRAPHIC RECORD FOR THE EVALUATION OF VESTIBULAR NYSTAGMUS

Francis M. Miskolczy-Fodor, M.D.

BY INVITATION

Godfrey E. Arnold, M.D.

BY INVITATION

New York

Discusser:
Nicholas Torok, M.D.
Chicago

The basic process of a vestibular reaction is the cupula deflection which determines the speed of the slow nystagmus movement. The registration of this speed has been achieved by some authors by means of especially designed equipment. Employing standard electroencephalographic (EEG) equipment, we developed a method to obtain such speed records through the electronystagmographic registration of corneoretinal potential changes. The method consists of several steps:

1. The average amplitude and frequency of the fast nystagmus component is determined from several time periods of the total nystagmus duration. These random samples should be periods of 3 to 6 seconds and should be evenly distributed over the whole vestibular reaction.

2. Determination of the turning speed for each of these samples. The turning speed is the product of the average amplitude and frequency. It indicates the

angular rotation of the eye during one second by adding all single nystagmus beats during this time interval, as if the nystagmus were a continuous movement in one direction.

3. Graphic plotting of the turning speed as a function of the duration of the vestibular reaction. This graph was termed the vestibulogram.

The turning speed resulted in typical curves for normal caloric reactions. In pathologic cases a marked reduction of the turning speed was observed. A reduced turning speed may be associated either with a shortened over-all nystagmus duration, or with normal values of total duration. This seems important. Remarkable test results were demonstrated in cases of unilateral labyrinthine hypacusis in which no vestibular abnormalities could be revealed by routine vestibular tests. In such cases, the vestibulogram showed marked reduction of the turning speed and flattening of the curve on the affected side, although the over-all duration appeared normal.

The vestibulogram considers the total nystagmus duration as only one component of a vestibular reaction, while all other components are summarized in the turning speed. The vestibulogram presents a sensitive method for the detection of unexpected deviations and new forms of vestibular abnormalities.

2:30 p.m.

THE TRANSPALATAL SURGICAL APPROACH TO THE NASOPHARYNX

Lup Quon Pang, M.D.
Honolulu, Hawaii

Discusser:

Harold G. Tabb, M.D.
New Orleans

Lesions in the nasopharynx may be approached by four main routes: (1) directly through the nose, (2) by a transmaxillary route, (3) directly through the nasopharynx, and (4) by a transpalatal approach. A brief discussion of the various methods is presented.

There are many modifications of the palatal approach. However, a transverse incision separating the soft palate from the hard palate gives the most direct access to the nasopharynx. This procedure was first used by the author in attempting the removal of a large chordoma of the nasopharynx. The exposure of the nasopharynx obtained by this method was so excellent that the author has used this approach in seven other cases.

This method was first described by Wilson in 1946. While this approach has been used by several American surgeons for the correction of choanal atresia, none have advocated its use in the removal of tumors.

A description of the operation together with illustrations is presented.

3:00 p.m.

THE PROBLEM OF CONGENITAL AURICULAR MALFORMATION

I. CONSTRUCTION OF THE EXTERNAL AUDITORY CANAL

Richard J. Bellucci, M.D.
New York

Discusser:

Robert Henner, M.D.
Chicago

In this series of 25 cases, interest centered upon the study of the anatomic variations, the reconstruction of a suitable external auditory meatus which resisted postoperative stenosis, and the application of the principles of tympanoplasty for the improvement of hearing. Observation of these cases forms the basis of our conclusions regarding surgical correction in cases of unilateral deformity when reconstruction of an external ear is also planned.

Our experiments with the presently used surgical techniques are reported with respect to the improvement in hearing and the cosmetic appearance of the reconstructed external auditory canal. The various problems encountered in this work are discussed.

II. CONSTRUCTION OF THE EXTERNAL EAR

John Marquis Converse, M.D.
New York

Discusser:

Edgar M. Holmes, M.D.
Boston

The construction of the external ear has always presented a formidable problem to the surgeon. In the past, attempts have been discouraging. Considerable progress has been made in recent years. New developments will be reviewed and the latest techniques and results illustrated.

4:00 p.m.

EMERGENCY CRICOTHYROTOMY (A Motion Picture)

Gene V. Williams, M.D.
BY INVITATION
David S. Ruhe, M.D.
BY INVITATION
and
Gunnar D. Proud, M.D.
Kansas City, Kansas

Discusser:

Thomas C. Galloway, M.D.
Evanston, Illinois

The purpose of this film is to present a pictorial record of the assessment of a number of instruments and techniques which have been designed to accomplish emergency cricothyrotomy. A knife is a safe and effective instrument in the hands of an experienced surgeon, but it feels awkward to the uninitiated.

In the event of a mass casualty situation following disaster, problems dealing with tracheobronchial secretions and other respiratory obstructions may be numerous. An instrument which gives courage and confidence to the novice could therefore lead to an increased salvage rate for the victims. All of the instruments known today have advantages and disadvantages which are demonstrated by the motion picture, and two new instruments for performing the procedure are introduced.

4:40 p.m.

EFFECTS OF BURYING EPITHELIUM IN THE MIDDLE EAR OF ANIMALS: CLINICAL IMPLICATIONS

Ben T. Withers, M.D.
and
Ben M. Nail, Jr., M.D.
BY INVITATION
Bob R. Alford, M.D.
BY INVITATION
Houston

Discussers:

James W. McLaurin, M.D.
Baton Rouge, Louisiana

Harold F. Schuknecht, M.D.
Detroit

The ears of twenty cats were operated upon under magnification, using full-thickness skin from the abdomen and mucosa from the mouth and conjunctiva. The drum and middle ear-bulla contents were removed and grafts buried, using an external skin layer to seal off the cavity. The effects of burying gelfoam in two ears and polyethylene tubing in two ears were studied. The ears were reopened from six weeks to six months later.

The following are the conclusions:

Use of (1) a double layer of skin, (2) skin with oral mucosa and (3) skin with conjunctiva, each combination being placed raw surface to raw surface to seal off the cavity, was unsuccessful in seven out of eight ears.

Burial of oral mucosa or conjunctiva on the medial wall of the middle ear-bulla cavity resulted in a noninfected air-bearing space. Skin buried in this fashion led to infected granulation tissue and cholesteatomatous material.

Gelfoam was completely absorbed, leaving no ill effect.

Polyethylene, buried, became covered by membrane and incited no gross infection in the process. Photomicrographs and surgical microscopy pictures support these findings.

Possible clinical implications in the human are twofold: the animal experiments may demonstrate (1) a means of ensuring an air-bearing middle ear space in tympanoplasty, and (2) an easily accessible material for use as an oval window graft in stapes surgery for otosclerosis.

SECTION ON OPHTHALMOLOGY

Wednesday, October 14, 1959

9:00 a.m.

GRAND BALLROOM

Presiding Officer:

JOHN H. DUNNINGTON, M.D.
President

Secretary:
KENNETH L. ROPER, M.D.

PROLIFERATIVE CHORIORETINITIS OF MACULA DUE TO NEMATODE LARVA

(A Clinicopathologic Case Report)

Mr. Norman Ashton
London, England
BY INVITATION

Presented by:
Joseph A. C. Wadsworth
New York

An 8-year-old girl attended Moorfields in 1952 with a history of deterioration of vision over a period of three years and slight photopsia for one year. A macular mass had recently been noted in the right eye at the school clinic. Past history of ptosis at birth with gradual recovery.

Examination: Visual acuity was 20/200 in the right eye and 20/20 in the left eye with a small hypermetropic refractive error. The right fundus showed a white umbilicated tumor at the macula with some vitreous opacity and choroidal disturbance at 6 o'clock.

The child was admitted for investigation. All tests were negative.

By September 1952, the tumor had increased in size and staff opinion favored excision; this was carried out in October 1952.

Macroscopic examination: Situated at the macula there was a small raised yellowish mass with a white center; it was well demarcated and completely localized. Except for delicate whitish scar tissue in the region of the ciliary body inferiorly, the eye appeared to be otherwise normal.

Microscopic examination: Anteriorly on the temporal side of the retina shows advanced cystic degeneration extending from the equator to the ora serrata, where the retina is dragged forward into a small fibrinous mass lying in the vitreous on the pars plana. Situated at the macula there is a well-defined mass consisting of fibrous tissue which extends inward into the vitreous through the fovea centralis, and outward to merge with Bruch's membrane and the choroid. On either side the retina is folded and shallowly detached. Within the fibrous mass there is a focal and diffuse infiltration with chronic inflammatory cells, among which numerous eosinophils may be seen. A similar but denser infiltration is present in the immediately adjacent choroid and the pigmentary epithelium has migrated into the fibrous mass.

Five of the serial sections through the lesion revealed the presence of fragments of a nematode larva lying in the center of the mass, but in none was there sufficient material to identify its exact nature; it is, however, most probably, that of **Ascaris lumbricoides.**

In view of the above findings, seven years after enucleation the patient was re-examined. Blood examination showed no eosinophilia. No evidence of parasitic infection could be found in the feces, and no history of old infection could be obtained from the mother.

9:10 a.m.

SYNDROMES WITH CONGENITAL CATARACTS

(XVI Jackson Memorial Lecture)

Professeur Dr. Jules Francois
Ghent, Belgium
or
Pasteurlaan, Belgium

10:00 a.m.

UNILATERAL INTERMITTENT SPONTANEOUS DILATATION OF RETINAL VEINS OF UNDETERMINED ETIOLOGY ASSOCIATED WITH BLINDNESS

(A Case History and Motion Picture)

Don W. Longfellow, M. D.
BY INVITATION
F. Sterling Davis, Jr., M. D.
BY INVITATION
Washington, D. C.

Murray C. Brown, M.D.
Bethesda, Maryland
BY INVITATION

This case is unique in that it presents intermittent attacks of venous engorgement of the retinal vessels of the left eye in a young male. The attacks are spontaneous but may be induced by exerting pressure over the eye. Temporary blindness ensues during an attack but normal vision returns as the vascular engorgement decreases. No cause has been determined despite numerous tests and consultations. A colored motion picture of the fundus demonstrates visually the progressive massive engorgement of the retinal veins during an attack.

10:20 a.m.

EXPERIENCES WITH VITREOUS PRESERVED BY LYOPHILIZATION

John Harry King, Jr., M. D.
Washington, D. C.

Shankar B. Chavan, M. D.
Hyderbad, India
BY INVITATION

John W. McTigue, M. D.
Washington, D. C.

Studies have been done with vitreous humour lyophilized or freeze-dried and stored in a container sealed in primary vacuum. Experiments using homologous and heterologous implants of lyophilized and fresh vitreous in animals will be reported. Clinical experiences with lyophilized human vitreous used for transplantation or implantation by many eye surgeons are compiled and summarized. Vitreous preserved by lyophilization and stored without refrigeration is compared to fresh vitreous and pooled vitreous stored in a refrigerator.

Human vitreous can be preserved by freeze-drying and can be stored for long periods with the powder sealed in vacuum. Rehydrated lyophilized vitreous resembles fresh vitreous and appears to have certain advantages when used for implantation in retinal detachments.

10:35 a.m.

FACIAL PAIN

Arnold P. Friedman, M. D.
BY INVITATION
Charles A. Carton, M. D.
BY INVITATION
New York

Discusser:
Alfred Uihlein, M. D.
Rochester, Minnesota
BY INVITATION

Facial pain is one of the more common and difficult problems which the physician is called upon to diagnose and treat. Precise diagnosis of facial pain is made difficult because of the extremely complex cranial and cervical root innervation, lack of correlation between the findings of the neurophysiologist and the clinician, and the psychologic aspects of the problem. The purpose of this paper is to present to the physician a plan for proper orientation and management of patients with this complaint. A great part of the material represents our experiences at the Montefiore Hospital Headache Clinic during the past ten years, in the diagnosis and treatment of facial pain. The classification, mechanism, diagnosis and treatment of this disorder will be discussed. Particular emphasis will be placed on the more common causes of facial pain, which is a group known as atypical neuralgias.

11:00 a.m.

REPORT: COMMITTEE ON USE OF ALPHA-CHYMOTRYPSIN IN OPHTHALMOLOGY

Derrick Vail, M. D., Chairman
Chicago

A. Edward Maumenee, M. D.
Baltimore

Ludwig von Sallmann, M. D.
Bethesda, Maryland

Richard C. Troutman, M. D.
New York

David Shoch, M. D.
Chicago

11:45 a.m.

RECENT ADVANCES IN ASEPTIC SURGICAL TECHNIQUE

Henry F. Allen, M. D.
Boston

Discusser:

James H. Allen, M. D.
New Orleans

Important concepts in aseptic technique include insistence upon absolute methods of sterilization for instruments and medications, individualization of treatment by the use of disposable units, and protection of patients and medications by sterile intermediaries.

The presentation will describe newer methods of gaseous sterilization, including the use of beta-propiolactone, and will emphasize the need for adoption of more stringent precautions by hospitals, clinics and private offices.

SECTION ON OTOLARYNGOLOGY

Wednesday, October 14, 1959

2:00 p.m.

GRAND BALLROOM

Presiding Officer:

GORDON D. HOOPLE, M.D.
Vice-President

Secretary:

EUGENE L. DERLACKI, M.D.

PRESENTATION OF NEW INSTRUMENTS

2:30 p.m.

HEARING TESTING IN THE VERY YOUNG CHILD
(A Motion Picture)

C. Olaf Haug, Ph.D.
BY INVITATION
and
Frederick R. Guilford, M.D.
Houston

Unfortunately, testing the hearing of the young child is all too often delayed until he has reached the age of 5 or 6 years, because it is virtually impossible to obtain an accurate assessment of his hearing loss with conventional audiometric techniques. In order to test successfully in the child from 20 to 48 months old and in the slightly older preschooler with short attention span, it is necessary to have a device for the game situation which will capture and hold his interest. Such a device must also motivate him to want to attend to the very faint threshold sounds. A motivating, interest-holding, jack-in-the-box device called the Pediacoumeter, which was developed by one of the authors, is our answer to this need, and to the other shortcomings found in conventional audiometric techniques with young children.

An eight-year follow-up of close to 1,000 preschoolers since our original presentation in 1952 is reported here. A motion picture will be shown which illustrates the technique of testing a 2-year-old patient with the Pediacoumeter.

2:50 p.m.

CHRONIC LYMPHO-EPITHELIAL SIALADENOPATHY
(XV Wherry Memorial Lecture)

James H. Maxwell, M.D.
Ann Arbor, Michigan

3:35 p.m.

MIDDLE EAR EFFUSIONS: CAUSES AND TREATMENT

Ben H. Senturia, M.D.
and
Carl F. Gessert, Ph.D.

BY INVITATION

Charles D. Carr

BY INVITATION

Elizabeth S. Baumann
BY INVITATION
St. Louis

Discussers:

Gordon D. Hoople, M.D.
Syracuse, New York

Oliver W. Suehs, M.D.
Austin, Texas

There has been much difference of opinion regarding the etiology and, therefore, the treatment of middle ear effusions. The authors recently reported their findings in a study of specimens ob-

tained from the middle ears of humans and presented a working classification based on their bacteriologic, cytologic and chemical examinations. They are of the opinion that most middle ear effusions are inflammatory in origin.

More recently, middle ear effusions were successfully produced in experimental animals by cauterizing the nasopharyngeal orifice of the eustachian tube, and the findings were correlated with those reported for humans. It appeared that the inflammation extended up the eustachian tube and caused marked changes in the mucoperiosteal lining of the middle ear and an effusion into the tympanum. Specimens of the fluid aspirated at planned intervals revealed cytologic and chemical findings which characterized them as serous or purulent. Serial sections of the eustachian tubes and bullae of these animals are being studied.

From the results of these human and animal observations, the authors will make suggestions regarding prophylaxis and therapy. In addition to the usual measures, it is recommended that early antibiotic prophylaxis be practiced in all those individuals susceptible to middle ear effusions. It is further urged that therapy be continued until it is certain that the mucoperiosteal lining of the middle ear has reverted to its original noninflammatory state. The appropriate time for myringotomy and aspiration, the indications for eustachian tube catheterization, and the proper use of the indwelling middle-ear catheter will be discussed. A brief reference will be made to in vitro enzyme studies now in progress.

4:05 p.m.

SPEECH AND SWALLOWING FUNCTION FOLLOWING SUPRAGLOTTIC SUBTOTAL LARYNGECTOMY

(A Motion Picture)

Joseph H. Ogura, M.D.
and
Sumner Holtz, M.D.
BY INVITATION
William E. Powers, M.D.
BY INVITATION
S. Eric Carlson, M.D.
BY INVITATION
St. Louis

The supraglottic structures are said to be important in deglutition and in the prevention of foreign bodies entering the larynx. Cineradiography using image intensification demonstrates altered function of deglutition and the mechanism of phonation following removal of the supraglottic structures.

4:20 p.m.

SURGICAL TREATMENT OF CANCER OF THE EAR AND TEMPORAL BONE

(Includes Motion Picture)

John J. Conley, M.D.
New York

Discussers:

John S. Lewis, M.D.
New York

Harold W. Jacox, M.D.
BY INVITATION
New York

A statistical analysis of cancer of the ear is being presented. Thirteen cases of the auricle, thirteen cases of the ear canal and eleven cases of the middle ear and temporal bone are reviewed, from the standpoint of age, sex, etiologic factors, histopathologic changes, previous treatment, metastasis, local recurrence, treatment and cure rate. All of the cases in this group were treated surgically. A description of the technique employed and suggestions for improved modifications are included.

SECTION ON OPHTHALMOLOGY

Thursday, October 15, 1959

9:00 a.m.

GRAND BALLROOM

Presiding Officer:
S. Rodman Irvine, M.D.
Vice-President

Secretary:
Kenneth L. Roper, M.D.

JUVENILE MELANOMA OF THE UVEA

(A Clinicopathologic Case Report)

Algernon B. Reese, M. D.
and
Robert M. Ellsworth, M. D.

BY INVITATION

New York

A boy, 2 years and 9 months old, was seen on February 3, 1958, because of a "spot" on the right eye which had been noted since birth. Three weeks before our examination the child was seen by two ophthalmologists and the patient was referred because of the possibility of a malignant tumor.

Right Eye: The eye appeared slightly smaller than the fellow eye and the corneal diameter measured slightly less than that of the left eye. The intraocular pressure was 63 mm. Hg with the Schiotz tonometer. Details of the anterior sector and fundus were somewhat obscured by corneal edema. The iris in general appeared a little darker than that of the left eye. There was a triangular area of vascularized fleshy tissue extending from the base of the iris at about 6 o'clock with the apex adherent to the posterior surface of the cornea near the pupillary area. To the nasal side of this in the angle was a light-colored nodule, and still more nasally two very small areas could just be seen in the angle with the gonioscope. The fundus of this eye showed a diffuse, mottled pigmentation except for above, where there was a large lighter, atrophic-appearing zone.

The histopathologic report indicated that this was a melanoma of the choriod, ciliary body, and iris with a malignant cytology. There were individual, as well as multinucleated, giant cells. In the superior part of the choroid, opposite the site of the tumor, were some calcium foci which may represent tumor necrosis and regression. Some chronic inflammation was present.

The diagnosis was juvenile melanoma of the uvea.

9:10 a.m.

HUMAN OCULAR ELECTROMYOGRAPHY

(A Motion Picture)

Arthur Jampolsky, M. D.
San Francisco

9:25 a.m.

SYMPOSIUM: CORNEAL SURGERY

Resume of the symposium held before the Academy of Ophthalmology and Otolaryngology in 1948, showing what progress has been made in Keratoplasty since that time, and the reasons for increasing success in this specialized field of surgery.

R. Townley Paton, M. D., Moderator
New York

Biologic Responses to Corneal Homografts

A. Edward Maumenee, M. D.
Baltimore

Instrumentation and Technique of Keratoplasty

Ramon Castroviejo, M. D.
New York

Therapeutic Keratoplasty

Max Fine, M. D.
San Francisco

11:00 a.m.

THE BARRAQUER METHOD OF REMOVING A DISLOCATED LENS

(A Motion Picture)

F. Phinizy Calhoun, Jr., M. D.
Atlanta

11:15 a.m.

FOREIGN BODIES AND INJURIES OF THE CILIARY BODY

Orwyn H. Ellis, M. D.
Los Angeles

Discusser:
William B. Clark, M. D.
New Orleans

In cases in which there is a small foreign body in the ciliary body, before opening the eye an attempt should be made to pull the foreign material into the anterior chamber. If it is not delivered, an incision should be made directly over the foreign body and an attempt made to pull it directly through the ciliary body if necessary, into the wound. Special techniques, localization and methods of removal for the especially difficult foreign bodies of this region are presented. In cases of large foreign bodies of the ciliary body, these are removed through an incision in the pars plana with light application of diathermy. Large foreign bodies of the ciliary body usually have a poor prognosis and result in loss of vision or even of the eye. Roentgenographic techniques and the use of the giant magnet are discussed. Careful surgery and good closure of wounds are emphasized.

11:45 a.m.

A QUASI-INTEGRATED BURIED MUSCLE CONE IMPLANT WITH GOOD MOTILITY AND ADVANTAGES FOR PROSTHETIC FITTING

Lee Allen
BY INVITATION

Alson E. Braley, M. D.
and
Edward C. Ferguson, III, M. D.
BY INVITATION

Iowa City

Discussers:
Maurice D. Pearlman, M. D.
Chicago

A. D. Ruedemann, M. D.
Detroit

The Allen-Braley implant, although completely buried, has in part the desirable features of the integrated implant. These desirable features are (1) support of the prosthesis without major dependence on the lower lid and fornix, (2) good transmission of movements from the implant to the prosthesis, and (3) the prevention of cyclic rotation of the prosthesis. These are accomplished by four rounded mounds on the front surface of the clear plastic implant which "key" into corresponding depressions in the back of the plastic prosthesis to support the prosthesis against gravitational pull and pressure from the upper lid. The lids, predominatly the upper, hold the prosthesis against the mounds.

A surgical technique has been evolved to facilitate imbrication of the four recti muscles between the mounds and closure of conjunctiva and Tenon's capsule, so as to mold these two layers without tension over the mounds. At the time of abstraction twenty-eight implants have been placed over a two-year period. One of these was extruded due to an experimental surgical procedure. Twenty-seven have been retained without complication and with less than average need for follow-up adjustments in the fit of the prosthesis. On the basis of early appearances, we anticipate favorable results regarding permanence.

The surgical procedure, healed sockets, and final cosmetic appearances are shown in a motion picture.

SECTION ON OTOLARYNGOLOGY

Thursday, October 15, 1959

2:00 p.m.

GRAND BALLROOM

Presiding Officer:
LYLE M. SELLERS, M.D.
Vice-President

Secretary:
EUGENE L. DERLACKI, M.D.

ACOUSTIC EFFECTS OF MIDDLE EAR SUBSTITUTION

Merle Lawrence, Ph.D.
Ann Arbor, Michigan

Except for the occasional successful stapes mobilization, present day microsurgery of the middle ear involves the use of autografts or artificial material as a substitution for the natural structures of the middle ear. Such alterations have an influence upon the acoustic properties of the sound transmission mechanism and so change not only the patient's threshold sensitivity but the re-

sponse characteristics of the ear to increasing intensities. These above-threshold properties are important to the surgical patient because they determine intelligibility to a great extent.

The experiments reported here concern measures of the auditory response in experimental animals as the sound is increased in intensity at various rates and maximum levels. These are repeated under various conditions in which the middle ear and its muscles are altered. Results and applications will be discussed.

2:30 p.m.

HEAD AND NECK MANIFESTATIONS OF THE CERVICO-OCCIPITAL SYNDROME

S. C. Missal, M. D.
Cleveland

Discusser:

James B. Costen, M.D.
St. Louis

Cervical nerve root compression can cause symptoms about the head and neck which may mimic a variety of disease entities encountered by the otolaryngologist. It is a common source of disability which is frequently overlooked, and its treatment is, therefore, neglected.

The syndrome can also be a forewarning of a serious disease condition and may alert the physician about the true source of the patient's complaints. Cervical root pressure may cause headaches, vertigo, tinnitus, otalgia, sore throats, and chest pains simulating serious pulmonary or cardiac disease. The etiology, symptomatology and differential diagnosis of this syndrome will be discussed. A simple yet effective course of therapy will be outlined.

3:00 p.m.

FENESTRATION OF THE OVAL WINDOW

(Includes Motion Picture)

John J. Shea, M.D.
Memphis

Discussers:

George E. Shambaugh, Jr., M.D.
Chicago

Howard P. House, M.D.
Los Angeles

The surgical treatment of otosclerosis has followed a natural evolution from the first attempts at mobilization of the stapes by Kessel, Miot, Jack and others, to the fenestration of the lateral semicircular canal by Sourdille, Holmgren, Lempert, Shambaugh and others, and then finally to the renewed attack upon the pathologic process directly by Rosen, which led quite naturally to the fenestration of the oval window. Since the oval window is the natural passageway through which sound travels, the removal of the ankylosed stapes together with the rebuilding of the ossicular chain is the ideal goal to be sought after in the correction of otosclerotic deafness.

In fenestration of the oval window the usual exposure to the stapes is carried out as in mobilization of the stapes. After thorough anesthesia of the middle ear with Xylocaine Hydrochloride used topically, the head of the stapes is removed and the mucoperiosteum surrounding the oval window is taken away to form a bed for the placement of the vein graft. The fenestra is then created in the oval window by removal of the footplate and saucerizing the edges of the fenestra with a very small cutting burr in the contra-angle handpiece. Great care is taken to see that no fragments or blood enters the vestibule. The fenestra is then covered with a thin piece of vein graft previously removed from the back of the patient's hand. The adventitia is placed against the fenestra, and the intima is placed upward toward the middle ear. A length of polyethylene 90 tubing (3 to 3.5 mm.) is then placed between the lower end of the incus and the center of the vein graft, being bevelled at its lower end where it rests upon the vein.

This operation has been done more than three hundred times. Good hearing has resulted in a large percentage of cases with a minimum of discomfort and of permanent injury to the ear.

3:40 p.m.

STAPES OPERATIONS: SPECIFIC PATHOLOGIC INDICATIONS FOR THE VARIABLE SURGICAL TECHNIQUES

J. Brown Farrior, M.D.
Tampa, Florida

Discussers:
Franz Altmann, M.D.
New York

Arthur L. Juers, M.D.
Louisville

The thesis of this presentation is that there are specific pathologic indications for each of the varied types of operations upon the stapes, the oval window, and the ampulla of the horizontal semicircular canal.

The original Rosen total stapes mobilization with indirect pressures on the incus, head or neck of the stapes, is now indicated only in small lesions of the anterior footplate when the stapes is deeply placed in the oval window niche. The anterior crurotomy, with mobilization and impaction of the posterior half of the stapes, is preferred in all anterior lesions, and for lasting hearing improvement it is mandatory in anterior crural otosclerosis. When both crura of the stapes are involved, special surgical techniques are required, the choice of techniques being dependent on the width of the oval window niche. In bicrural otosclerosis, with a wide oval window niche, the central area of the footplate is mobilized and the posterior crus repositioned away from the otosclerosis. In bicrural otosclerosis with a narrow oval window niche, the crura of the stapes are removed, the central area of the footplate is mobilized, and artificial crura are inserted. Thin complete footplate otosclerosis may respond to total stapes mobilization. Thick complete footplate otosclerosis is a pathologic indication for the oval window and vein graft or the fenestration operation. Revisions (secondary stapes operations) are indicated only if the primary pathologic changes were favorable and the primary surgical intervention inadequate or inappropriate for the specific pathologic entity. Otherwise, the fenestration operation is the procedure of choice.

The specific appropriate stapes operation should be performed as the primary operation. Preoperatively, all stapes surgeons should be fully prepared to perform any and all types of stapes operations dependent upon the existing pathologic changes. Accurate diagnosis of the disease is therefore necessary if the surgeon is to perform the appropriate stapes operation.

4:15 p.m.

PANEL DISCUSSION: NASAL POLYPS
(Sponsored by the American Society of Ophthalmologic and Otolaryngologic Allergy)

Kenneth L. Craft, M.D., Moderator
Indianapolis

French K. Hansel, M.D.
St. Louis

Herman Semenov, M.D.
Beverly Hills, California

Sam H. Sanders, M.D.
Memphis

William H. Evans, M.D.
Youngstown, Ohio

The subject matter will be discussed from the standpoints of (1) pathology, (2) classification and diagnosis, (3) sinus involvement, (4) allergic and medical management, and (5) surgical indications.

SECTION ON OPHTHALMOLOGY

Friday, October 16, 1959

9:00 a.m.

GRAND BALLROOM

Presiding Officer:

JOHN H. DUNNINGTON, M.D.
President

Secretary:
KENNETH L. ROPER, M.D.

RETINAL INVOLVEMENT IN IDIOPATHIC HYPERLIPEMIA

(A Clinicopathologic Case Report)

Frederic C. Blodi, M. D.
Iowa City

The most frequently observed ocular manifestation of idiopathic hyperlipemia is a lipemia retinalis. Other associated findings occasionally seen in or around the eye are lipid keratitis and xanthoma of the lids.

Retinal changes, such as sheathing of the vessels, macular edema, yellowish deposits, hemorrhages and detachment have been observed clinically.

This 47-year-old man was followed for several years. He came to the hospital because of loss of vision in one eye which was due to a macular edema. The ophthalmoscopic picture developed into that of a Coats' disease. Retinal detachment and secondary glaucoma followed. The histologic examination revealed numerous fat-staining deposits in the retina. The other eye is only slightly involved. The laboratory tests were characteristic for severe idiopathic hyperlipemia.

9:10 a.m.

PRESENTATION OF NEW INSTRUMENTS

9:30 a.m.

RETINAL DETACHMENT SURGERY: SCLERAL SHORTENING BY OUTFOLDING WITH TITANIUM METAL CLIPS

Ramon Castroviejo, M. D.
New York

Discusser:
Samuel J. Meyer, M. D.
Chicago

When on selected cases of retinal detachment shortening of the sclera seems to be indicated in preference to a simpler operation, I have been using a technique of scleral shortening which consists in folding the sclera outward after evacuation of subretinal fluid and maintaining the fold by titanium clips. Diathermic coagulations are performed along the edge on the disc side of the fold. The length of the fold depends upon the extension of the detachment. The clips of titanium have proved to be well tolerated over periods ranging between several months and three years. The results obtained in 50 selected, unfavorable cases of retinal detachment seem to compare favorably with those obtained by using more complicated procedures of scleral shortening. This report will describe the operation briefly and will evaluate the results obtained in 50 cases with a period of observation between six months and three years.

9:55 a.m.

PERFORATING KERATOPLASTY IN TOTAL STAPHYLOMA OF THE CORNEA

(A Motion Picture)

Diego Cuevas Cancino, M. D.
Mexico, D. F.
BY INVITATION

10:10 a.m.

OPTIC NEURITIS IN CHILDREN

Charles Kennedy, M. D.
Philadelphia
BY INVITATION
and
Frank D. Carroll, M. D.
New York

Discusser:
C. Wilbur Rucker, M. D.
Rochester, Minnesota

Forty-one cases of optic neuritis in chidren, seen at the Columbia Presbyterian Medical Center over the past 25 years, were reviewed, and in 37 of these follow-up examinations were carried out. Classified with respect to etiologic background, two were luetic, one followed measles, two were associated with malnutrition, and one occurred in a child with diabetes and bilateral nerve deafness. This was considered to be an additional instance of an unusual syndrome originally described by Wolfram. Four children had hereditary optic atrophy, and one later developed Schilder's disease. The remaining 30 cases were of unknown cause at onset, but in 8 of these the diagnosis of multiple sclerosis was made in a variable period of time up to sixteen years later. The clinical characteristics of optic neuritis of unknown cause are reviewed in detail and certain features are emphasized as peculiar to children, such as (1) the high frequency of bilateral involvement, (2) the pre-

dominance of papillitis as opposed to retrobulbar involvement, (3) the high degree of unreliability of the visual fields and of the history with respect to suddenness of onset of visual failure. Because papillitis cannot be distinguished from papilledema on ophthalmoscopic examination, the differential diagnosis includes intracranial mass lesions and other conditions causing an increase in cerebrospinal fluid pressure. For this reason it is frequently necessary for management to be a joint responsibility of ophthalmologist, neurologist, and neurosurgeon. Treatment is discussed.

10:40 a.m.

OPHTHALMODYNAMOMETRY: A TECHNIQUE FOR THE DIAGNOSIS OF INTERNAL CAROTID ARTERY DISEASE

(A Motion Picture)

James F. Toole, M. D.
Philadelphia
BY INVITATION

Albert M. Potts, M. D.
Cleveland
and
Murray C. Brown, M. D.
Bethesda, Maryland
BY INVITATION

10:55 a.m.

CYCLODIATHERMY WITH SCLERAL FLAP

Leonard Christensen, M. D.
and
Clyde DuVall, M. D.

BY INVITATION

Portland, Oregon

Discussers:
Clarence H. Albaugh, M. D.
Los Angeles

Graham Clark, M. D.
New York

One of the disadvantages of the present techniques of transcleral cyclodiathermy is the severe damage that occurs to the sclera overlying the ciliary body. A method of applying diathermy almost directly to a selected area of the ciliary body without heat damage to the sclera will be described. The surgical technique and some immediate histologic changes will be described and illustrated. The merits of cyclodiathermy as an antiglaucoma procedure will not be considered.

11:25 a.m.

WAARDENBURG'S SYNDROME

Richard W. Olmsted, M. D.
BY INVITATION

Angelo M. DiGeorge, M. D.
BY INVITATION

Philadelphia
and
Robison D. Harley, M. D.
Atlantic City, New Jersey

Discusser:
Harold F. Falls, M. D.
Ann Arbor, Michigan

A syndrome consisting of heterochromia iridis, white forelock, lateral displacement of the lacrimal puncta, a broad nasal root, hyperplasia of the eyebrows and deafness was first described by Waardenburg in 1951. There are no other reported series of the disorder nor has it been reported previously in Negroes.

This paper will present a detailed report of the occurrence of this syndrome in two Negro families. Five additional typical instances of this syndrome, which were discovered as a result of a survey of an institution for deaf children in the Philadelphia area, will be shown with a schematic pedigree. Results of detailed audiometric and ophthalmologic examinations on all the affected children will be presented. Other previously undescribed facial characteristics will be mentioned.

Evidence will be presented that the syndrome is inherited as an autosomal dominant of variable expressivity. In the present survey, 1.5 per cent of institutionalized deaf children have this genetic abnormality. However, many of the relatives of these children have the other components of the disorder without deafness or with only minimal loss of hearing.

The relationship of this disorder to previously reported instances of deafness in animals will be discussed. The possible relationship of the pigmentary defect to the nerve deafness and other ocular syndromes will also be indicated.

11:50 a.m.

THE NATURE OF THE ANTIBACTERIAL EFFECT OF HUMAN VITREOUS

Kevin Hill, M. D.
Boston

BY INVITATION

Discusser:

Donald M. Shafer, M. D.
New York

The present studies were initiated in an attempt to identify the antibacterial substance in human vitreous first reported by Shafer in 1957 and later confirmed by Reed, Wilt and Tushingham and by Bussey, Shafer and Hughes. When individual samples of human vitreous were tested in the manner used by Bussey and his colleagues, it became apparent that some samples inhibited bacterial growth while others had no obvious inhibitory effect.

The possibility occurred that this variation among individual vitreous samples might be due to antibiotics previously administered to the eye donors. The hospital records of the vitreous donors were examined and the patients admitted for enucleation were questioned to determine whether or not antibiotics had been administered prior to enucleation.

To date, of 20 different human vitreous samples tested, 13 donors had not received systemic antibiotics for at least five days prior to enucleation. Of these, no vitreous sample showed any antibacterial activity. The 7 other eye donors had received various systemic antibiotics and all showed antibacterial activity.

Five other eye donors had not received systemic antibiotics but their vitreous did show antibacterial activity. All 5 eyes had been used for corneal transplantation procedures and had been rinsed with a Polymyxin B—Neomycin collyrium which remained in contact with the eyes for at least two days prior to aspiration of the vitreous. Vitreous from the fellow eye of one of the above 5 eyes was obtained before exposure to the collyrium. This vitreous showed no antibacterial activity.

A patient admitted for enucleation received no antibiotics except systemic penicillin for 24 hours prior to operation. Vitreous from the eye demonstrated antibacterial activity which could be eliminated by the addition of penicillinase to an aliquot of the vitreous incubated and compared with the untreated vitreous. The antibacterial activity of other vitreous samples from donors who had received penicillin could be similarly negated by penicillinase.

Although the present study is by no means exhaustive, it would appear that the antibacterial activity of individual human vitreous samples is due to the presence of antibiotics administered systemically to the donors shortly before aspiration of the vitreous or, in some instances, applied to the eyes after enucleation but before aspiration of the vitreous.

12:10 p.m.

ACTIVE AND PASSIVE IMMUNIZATION AGAINST PSEUDOMONAS INFECTION OF THE CORNEA

J. Wallace McMeel, M. D.
Ronald M. Wood, Ph.D.
Baltimore

BY INVITATION

Discusser:

Ted Suie, Ph.D.
Columbus, Ohio

1. A group of rabbits was actively immunized against Pseudomonas aeruginosa by intravenous innoculation with the heat-killed organisms over a three-week period. When challenged with a corneal infection with Pseudomonas, there was complete protection with no residua in 85 per cent of the eyes.

2. Gamma globulin from actively immunized animals was given to normal rabbits in graduated doses (14 mg., 28 mg., 70 mg., and 140 mg.) intramuscularly 48 hours prior to intracorneal challenge with an actively growing culture of Pseudomonas. Other groups of rabbits were given 140 mg. of the Pseudomonas-immune gamma globulin at intervals as long as 24 hours after infection.

The results show complete protection of the corneas of the animals receiving 70 mg. and 140 mg. of the Pseudomonas-immune gamma globulin 48 hours prior to challenge. Of the animals receiving the gamma globulin at the varying intervals after challenge, over half show complete protection.

Active and passive protection of the cornea against Pseudomonas infection has been demonstrated.

SPECIAL SCIENTIFIC PROGRAMS

These Special Programs are open meetings. All members and guests of the Academy are welcome to attend.

TEACHERS' SECTIONS — OPHTHALMOLOGY and OTOLARYNGOLOGY

Grand Ballroom

Sunday, 9:00 a.m.

JOHN A. KIRCHNER, M. D.
A. D. RUEDEMANN, M. D.
Co-Chairmen

UNDERGRADUATE TEACHING OF OTOLARYNGOLOGY
A. C. FURSTENBERG, M.D.
Moderator

Viewpoint of a Senior Medical Student
To Be Announced

Viewpoint of a Dean
ROBERT B. HOWARD, M. D.
University of Minnesota
Minneapolis

Viewpoint of a General Practitioner
To Be Announced

Viewpoint of an Otolaryngologist
GORDON D. HOOPLE, M. D.
Syracuse, New York

General Philosophy of Professional Liability Insurance
JOSEPH K. DENNIS
Chicago

Medical Records
WARD FISHER
Chicago

COMMITTEE ON CONSERVATION OF HEARING

and

OTOSCLEROSIS STUDY GROUP

Grand Ballroom

Sunday, 8:00 p.m.

DEAN M. LIERLE, M.D.
EDMUND P. FOWLER, JR., M.D.
Co-Chairmen

Opportunities for Research and Research Training in the Field of Hearing
GORDON H. SEGER, DR. P.H.
National Institute of Neurological Diseases and Blindness
Bethesda, Maryland

Differential Diagnosis of Dysacousis in Children
SHULAMITH KASTEIN
Columbia-Presbyterian Medical Center
New York

Osteogenesis and Ankylosis of the Stapes Footplate
DOROTHY WOLFF, PH. D.
RICHARD BELLUCCI, M.D.
Manhattan Eye and Ear Hospital
New York

FRANZ ALTMANN, M.D.
MILOS BASEK, M.D.
College of Physicians and Surgeons, Columbia University
New York

JOHN R. LINDSAY, M.D.
University of Chicago
Chicago

AMERICAN ORTHOPTIC COUNCIL
and
AMERICAN ASSOCIATION OF ORTHOPTIC TECHNICIANS

Waldorf Room

Conrad Hilton Hotel

Sunday, 8:00 p.m.

PHILIP KNAPP, M.D.
President

EDMOND L. COOPER, M.D.
Secretary

SYMPOSIUM: PLEOPTICS IN THE TREATMENT OF STRABISMIC AMBLYOPIA

HERMANN M. BURIAN, M.D.
Moderator

Introduction

DR. BURIAN

Pathophysiology of Amblyopia: Diagnostic and Therapeutic Principles of Pleoptics

GUNTER K. VON NOORDEN, M.D.
Iowa City

Pleoptic Diagnosis and Treatment

GERALDINE L. WILSON
New York

Active Amblyopia Treatment: Clinical Results

JAMES E. MILLER, M.D.
St. Louis

Pleoptic Treatment of Amblyopes with Central and Eccentric Fixation

NANCY M. CAPOBIANCO
Rome, Italy

Summary

DR. BURIAN

COMMITTEE ON RECONSTRUCTIVE PLASTIC SURGERY: OTOLARYNGOLOGY

Crystal Room

Tuesday, 8:00 p.m.

JOHN MARQUIS CONVERSE, M.D.
Chairman

Surgical Treatment of Malignant Lesions of the External Nose

VARAZTAD H. KAZANJIAN, M.D.
Boston

Composite Grafts

OSCAR J. BECKER, M.D.
Chicago

Reconstruction of the Face Following Cancer

G. KENNETH LEWIS, M.D.
Chicago

The Blowout Fracture of the Floor of the Orbit

JOHN MARQUIS CONVERSE, M.D.
BYRON SMITH, M.D.
New York

COMMITTEE ON RECONSTRUCTIVE PLASTIC SURGERY: OPHTHALMOLOGY

Grand Ballroom

Tuesday, 8:00 p.m.

WENDELL L. HUGHES, M.D.
Chairman

Program to be announced.

AMERICAN SOCIETY OF OPHTHALMOLOGIC AND OTOLARYNGOLOGIC ALLERGY

Private Dining Room 14

Friday, 8:45 a.m.

MICHAEL H. BARONE, M.D.
President

Introductory Remarks by Dr. Barone

ALLERGY AND IMMUNITY IN OTOLARYNGOLOGY AND OPHTHALMOLOGY:

PANEL DISCUSSIONS

9:00 a.m.

History; Diagnosis; Manifestations

LINDEN J. WALLNER, M.D., *Moderator*
Chicago

WILLIAM T. K. BRYAN, M.D.
St. Louis

SYLVESTER C. MISSAL, M.D.
Cleveland

SAM H. SANDERS, M.D.
Memphis

JOSEPH W. HAMPSEY, M.D.
Pittsburgh

9:50 a.m.

Treatment: Specific and Nonspecific

FRENCH K. HANSEL, M.D., *Moderator*
St. Louis

WILLIAM H. EVANS, M.D.
Youngstown, Ohio

AUBREY G. RAWLINS, M.D.
San Francisco

RAYMOND L. HILSINGER, M.D.
Cincinnati

GEORGE L. LOOMIS, M.D.
Winona, Minnesota

10:40 a.m.

Dermatoses in Ophthalmology and Otolaryngology

LELAND H. PREWITT, M.D. *Moderator*
Ottumwa, Iowa

S. ALBERT HANSER, M.D.
St. Louis

PHILLIPS THYGESON, M.D.
San Jose, California

JAMES J. O'NEIL, M.D.
Omaha

KENNETH L. CRAFT, M.D.
Indianapolis

11:30 a.m.

Allergy in Ophthalmology: External Eye; Cornea and Iris; Retina and Choroid

BRITTAIN F. PAYNE, M. D. *Moderator*
New York

A. D. RUEDEMANN, M.D.
Detroit

FREDERICK H. THEODORE, M.D.
New York

LELAND H. PREWITT, M.D.
Ottumwa, Iowa

12:30 p.m.

Business Meeting

SCIENTIFIC EXHIBITS

KENNETH L. ROPER, M.D., *Chairman*
EUGENE L. DERLACKI, M.D., *Co-Chairman*
CHICAGO, ILLINOIS

LOCATION:

Registration Area, 4th Floor

Exhibit S-1
American Board of Opticianry and Educational Foundation in Ophthalmic Optics

CHARLES SHEARD, Ph.D., Secretary of the American Board of Opticianry, Rochester, Minnesota, and HOWARD QUACKENBUSH, Chairman, Exhibit Committee, Columbus, Ohio.

Information regarding the functions and work of the American Board of Opticianry and its Educational Foundation in Ophthalmic Optics will be made available through various printed materials and charts regarding schools, collegiate curricula, scholarships and achievement awards; classes of certification and requirements; application blanks and general information regarding character, time and places of examinations.

Exhibit S-2

New Eyes for the Needy, Inc.

NEW EYES FOR THE NEEDY, INC., Short Hills, New Jersey, represented by Mrs. Arthur F. Goat, Mrs. Howland B. Jones and Mrs. James S. Van Derbeck.

New Eyes for the Needy, Inc., is a nonprofit volunteer charity dedicated to providing better vision to needy people both in this country and abroad. No money is solicited; the work is made possible through reclamation of discarded eye glasses and precious-metal scrap. New prescription glasses and artificial eyes are given to individuals screened by welfare agencies. Re-usable plastic framed glasses are tested and sent to hospital clinics and foreign missions. Funds have been established with 67 hospitals, and many welfare agencies are allotted specific numbers of glasses per year.

Exhibit S-3

Textbooks for the Visually Handicapped

AID TO VISUALLY HANDICAPPED, San Francisco, represented by Maurice D. Hart, M.D., Mrs. Gene Marchi, and Mrs. Maurice D. Hart

The exhibit is devoted to demonstration of large-type printed textbooks which have been transcribed into 18 point type from normal print books used in the public schools in California. The work is done by volunteers of AID TO VISUALLY HANDICAPPED, and distributed, free of charge, to all school districts and public libraries for the express purpose of aiding partially sighted children who are unable to read the smaller print textbooks.

Exhibit S-4

Home Study Courses, American Academy of Ophthalmology and Otolaryngology

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY, represented by Daniel Snydacker, M.D., Secretary for Home Study Courses, Chicago, and Peter N. Pastore, M.D., Associate Secretary in charge of Otolaryngology, Richmond, Virginia

This exhibit will show the purposes, scope and organization of the Home Study Courses.

Exhibit S-5

The Seeing Eye, Inc.

THE SEEING EYE, INC., Morristown, New Jersey

Exhibit consists of a seven-panel standing screen 62 inches high and 124 inches in length; ten letter-size posters for affixing to back drop; and assorted literature to be displayed on table.

Exhibit S-6

If Blindness Occurs After Fifty

AMERICAN FOUNDATION FOR THE BLIND, INC., New York, represented by M. Robert Barnett and Kathern F. Gruber, New York; Richard E. Hoover, M.D., Baltimore

Charts, posters, photographs, optical aids, and literature pertaining specifically to the people who become blind after the age of fifty. A professional staff member of the Foundation and a consulting ophthalmologist will be present at the booth at all times.

LOCATION:

Club Floor

Exhibit S-7

Psychophysiology of Heredodegenerative Conditions of the Retina

H. RICHARD BLACKWELL, Ph.D., O. MORTENSON BLACKWELL, and WILLIAM H. HAVENER, M.D., Department of Ophthalmology, The Ohio State University, Columbus Ohio

This is a presentation of psychophysiological data obtained on patients with heredodegenerative conditions of the retina. Data include luminosity curves, hue discrimination findings, visual acuity measured as a function of retinal illuminance, and foveal and peripheral dark adaptation curves. These data will be presented for several different heredodegenerative conditions for affected members of families and for those believed to exhibit carrier states of the condition, as well as for normal members of the families. Such conditions as complete and incomplete achromatopsia and retinitis pigmentosa will be included.

Exhibit S-8

Anatomical Variations and Anomalies Encountered in the Operation for Mobilization of the Stapes

JACK VAN DOREN HOUGH, M.D., Oklahoma City Clinic, and Wesley Hospital Foundation, Oklahoma City

The exhibitor has been greatly impressed with the marked number of anatomic variations and congenital anomalies found in the middle ear while doing operations for mobilization of the stapes.

HEARING TESTS

The Committee on Conservation of Hearing will conduct hearing tests during the week of the Annual Meeting. Three soundproof booths will be placed in the registration area and will be manned by technicians selected by the Committee. It is proposed to test the hearing of as many of the doctors attending the meeting as possible. An audiogram will be given the person so tested.

Variations of as little as a fraction of a millimeter have become extremely important in present day microscopic surgery. Despite previous impressions, middle ear anomalies are very frequently and unexpectedly encountered. These distortions of landmarks may require marked alteration in the operative procedure which the surgeon has previously planned. Many of these observations by the exhibitor have been photographically recorded that this experience might be shared. Color photographic transparencies representing selected views seen during the course of over 1500 routine operations for mobilization of the stapes done by the exhibitor will be displayed. These large transparencies will be retroilluminated. In order to identify each structure accurately, the color plates will be accompanied by labeled drawings. Appropriate descriptions will be given and embryologic discussion will be offered where indicated. Congenital anomalies will be seen in abundance and a large variety of physiologic and pathologic variations in the anatomy of the middle ear will be presented in this display.

Exhibit S-9

Diagnostic and Surgical Aids in Otology

HOWARD P. HOUSE, M.D., WILLIAM F. HOUSE, M.D., FRED H. LINTHICUM, Jr., M.D., JAMES L. SHEEHY, M.D., and W. EUGENE COMPERE, M.D., representing the University of Southern California School of Medicine, and the Los Angeles Foundation of Otology, Los Angeles

A. Uses of polyethylene in middle ear surgery

Polyethylene plays an integral part in middle ear surgery. Its use in the treatment of congenital abnormalities, otosclerosis, chronic otitis media, serous otitis media, and traumatic ossicular disorders will be demonstrated by drawings, pictures, and anatomic preparations.

B. Use of the diamond drill in middle ear surgery

The diamond drill is an instrument which has been found to be especially useful in surgical procedures on the middle ear because it will cut bone while not cutting the adjacent soft tissue. Its various uses and adaptations will be illustrated.

C. Techniques of radiological examination of the temporal bone

Stereoscopic radiography of the temporal bone is assuming a greater importance as a diagnostic aid in otology. Radiographic techniques will be demonstrated. Included will be an exhibition of stereoscopic films depicting normal and abnormal bones.

Exhibit S-10

Primary Repair of Defects Following Removal of Tumors of the Face

JOEL JAY PRESSMAN, M.D., and MILDRED BURTZ SIMON, Los Angeles, and WALTER BERMAN, M.D., Beverly Hills, representing the City of Hope Medical Center, Duarte, California, and the School of Medicine, University of California at Los Angeles

This exhibit consists of nine panels, each of which demonstrates the removal of a tumor of the face and primary repair of the defect. Included are lesions of the cheek, auricle, and lips. Surgical principles displayed are "sliding flaps," lip stripping, V-excision of the lip, Abbe Eslander flaps, and the use of the skin of the eyelid for full-thickness grafts.

Exhibit S-11

Clinical Nystagmography

NICHOLAS TOROK, M.D., VICTOR GUILLEMIN, Jr., Ph.D., ALAN KAHN, M.D., and FLORIAN NYKIEL, University of Illinois College of Medicine, Chicago

Nystagmus is the most valuable objective sign of vestibular stimulation. The unaided observation is difficult, inaccurate or even impossible. Nystagmus recordings became available recently, not only in the experimental laboratory, but also for clinical use. A simple method was developed by these investigators, based upon photoelectric principles. This meth-

od has many advantages over recordings obtained by the use of electrodes placed in the immediate vicinity of the eye. A nystagmogram reveals more exact and more comprehensive information. Detection of spontaneous nystagmus is a matter of routine when such phenomena cannot be seen or differentiated by unaided observation. The following characteristics of the reactive (caloric or rotatory) nystagmus can be traced: duration, maximum frequency, frequency pattern, total amplitude, and angular velocity of the slow component or, as it is generally called, eye speed.

Exhibit S-12

The Pathogenesis of Acute External Otitis

EDLEY H. JONES, M.D., Vicksburg, Mississippi, and TOM D. NORMAN, M.D., Little Rock, Arkansas, representing the University of Mississippi School of Medicine, Jackson

This exhibit portrays a fairly comprehensive study of the histopathology of chronic and acute inflammations of the external ear canal in living patients, representing a correlated clinical and histopathologic study of more than sixty patients. While the microanatomy of the normal ear is reviewed for comparison, the exhibit primarily displays the frequently encountered forms of external otitis, both acute and chronic. These are illustrated by colored transparencies, which include photographs of the ears and photomicrographs (low and high magnification) of the histopathologic changes, presenting a better understanding of inflammatory changes clinically found in patients suffering with "acute external otitis."

Exhibit S-13

The Cricoarytenoid Joint

HANS VON LEDEN, M.D., and PAUL MOORE, Ph.D., Chicago, representing Northwestern University Medical School and The William and Harriet Gould Foundation

Recent anatomic and photographic investigations present new evidence at variance with the traditional concept of arytenoid motion. The action of the principal laryngeal joint is governed by the configuration of the two opposing articular surfaces, the saddle-shaped facet of the arytenoid cartilage sliding on the tubular facet of the cricoid cartilage. Animated models and serial photographs from high speed motion pictures demonstrate the movements of these cartilages through three dimensions. Manually operated specimen permits confirmation of these findings by the interested spectator.

Exhibit S-14

Secretory Otitis Media in Children

CLIFFORD FRANKLIN LAKE, M.D., and ROGER L. J. KENNEDY, M.D., Mayo Clinic, Rochester, Minnesota

This exhibit will show models of the tympanic membrane demonstrating differences in appearance of various types of secretory otitis media. A model of the normal tympanic membrane also will be shown. A suitable explanatory legend accompanies each model. Photographs of the examination of the patient and of the patient being treated will be presented. There will also be a space for before-and-after audiogram charts. Some photomicrographs of smears taken from the various types of secretory otitis media will be displayed with suitable legends. Models demonstrating the common etiologic factors, the technique of removal of lymphoid tissue from the nasopharynx, and myringotomy will be shown.

Exhibit S-15

Retinal Tears in Eyes Examined at Autopsy

EDWARD OKUN, M.D., Department of Ophthalmology, Washington University School of Medicine, St. Louis

A collection of eyes removed at autopsy containing retinal tears in all stages of development will be displayed, to be viewed with magnification. Enlarged color transparencies of similar holes plus photomicrographs of the histopathologic findings will be on display adjacent to each specimen.

Exhibit S-16

Causes of Blindness Among Children

NATIONAL SOCIETY FOR THE PREVENTION OF BLINDNESS, New York, represented by John W. Ferree, M.D., Executive Director, Virginia Smith Boyce, Assistant Director, and Ruby M. Hopkins

Analysis of diagnostic data on approximately 6,000 children attending schools and classes for the blind will show the relative importance of the various causes of blindness. Progress in controlling some of these causes will be indicated through trends computed over a twenty-year period.

Exhibit S-17

Ergotamine Tartrate in the Treatment of Vascular Headache

ARNOLD P. FRIEDMAN, M.D., H. MIKROPOULOS, M.D., and E. VALLEJO, M.D., representing Montefiore Hospital, Headache Unit, New York

Ergotamine tartrate is a valuable chemical agent for relieving migraine and vascular headaches. The purpose of this exhibit is to provide a better understanding of the administration of the drug.

The exhibit consists of charts and diagrams which demonstrate its history and pharmacology in relation to vascular headaches. Our clinical evaluation of the use of ergotamine and related compounds in 2,500 cases during the past ten years, including methods of administration and dosage, is presented.

Exhibit S-18

Auditory Tests in Diagnosis

JAMES JERGER, Ph.D., RAYMOND CARHART, Ph.D., and JOYCE SHEDD, Evanston, Illinois, representing Northwestern University, and the USAF School of Aviation Medicine, Randolph Air Force Base, Texas

Case presentations illustrate the patterns of auditory test results characteristic of lesions at different sites within the auditory mechanism. Conventional and Bekesy audiograms, SISI test, loudness balance test, and distorted speech test results will be presented for cases of middle ear, inner ear, eighth nerve, and temporal cortex involvement.

Exhibit S-19

Clinicopathologic Study of the Cornea

LORENZ E. ZIMMERMAN, M.D., Washington, D. C., and WILLIAM F. HUGHES, Jr., M.D., Chicago; and SAM T. JONES, M.D., Portland, Oregon, representing the Armed Forces Institute of Pathology, The Registry of Ophthalmic Pathology, Washington, D. C.

Corneal buttons removed from patients at the time of keratoplasty have recently provided histologic material which was previously difficult to obtain. The purpose of this exhibit is to correlate the clinical features of certain corneal diseases (dystrophies, inflammation, etc.) with the histopathologic alterations found in the excised corneal tissue.

Exhibit S-20

Studies of Certain Mesodermal Tissues of the Eye

HELEN H. CHI, M.D., MIGUEL MARTINEZ, M.D., and C. C. TENG, M.D., representing The Eye-Bank for Sight Restoration, Inc., New York

1. The endothelium was injured in experimental animals by mechanical means. Its stage-by-stage repair is presented in photomicrographs.

2. Full-thickness corneas were preserved in various sugars, in glycerin and in liquid paraffin. The reaction of the cornea to these agents is shown in histologic studies.

3. In serial sections of pathologic human eyes the lytic effect of the aqueous is demonstrated on collagen fibers that have been exposed due to a defect in the normal cellular covering.

Exhibit S-21

Army Audiology and Speech Center, Walter Reed Army Hospital

AUDIOLOGY AND SPEECH CENTER, WALTER REED ARMY HOSPITAL, Washington, D. C., represented by Major James P. Albrite, MC

Pictorially presented are the functions of the Army Audiology and Speech Center, including diagnosis and treatment of hearing and speech disorders. Also shown are some research projects in the field of communicative problems.

Exhibit S-22

Anterior Chamber Lens

DUPONT GUERRY, III, M.D., WOLFGANG A. LIEB, M.D., and WALTER J. GEERAETS, M.D., representing the Medical College of Virginia, Department of Ophthalmology, and the Titmus Research Laboratory, Richmond, Virginia

Experimental development of lens and instruments. The definitive lens and technique of implantation. Selected cases and results.

Exhibit S-23

Modern Therapy of Uveitis

DAN M. GORDON, M.D., representing New York Hospital, Cornell Medical Center, and The Lilian Margolyes League, New York

The sine qua non of therapy in cases of intraocular inflammation is the immediate control of the disease to prevent ocular damage. Adequate corticosteroid therapy offers us a convenient tool for such control. In the absence of ability to pinpoint the cause of the uveitis, and with the lack of specific therapy, it may be our only effective weapon. In chronic uveitis, corticosteroid therapy may be the only barrier to blindness.

Exhibit S-24

A Method of Otoplasty: Reconstruction of the Anthelix and Scaphoid Fossa

RICHARD T. FARRIOR, M.D., Tampa, Florida

The exhibit presents a new technique for the correction of protruding ears, emphasizing normal contour of the anthelix and scaphoid fossa. Original methods for producing a gradual convexity of the superior crus and a prominent anthelix proper without sharp angulations are incorporated with existing techniques to obtain the desired results. Illuminated color transparency enlargements are accompanied by printed descriptions of the anatomy, the surgical technique, the surgical results, and additional combined techniques. The normal contour of the ear as seen from the side is emphasized as well as simple correction of the protrusion.

Exhibit S-25

Application of Ultrasonic Locating Techniques to Ophthalmology

GILBERT BAUM, M.D., Port Chester, New York, and IVAN GREENWOOD, Stamford, Connecticut, representing the Department of Ophthalmology, New York University Post-Graduate Medical School, and the United States Public Health Service, Veterans Administration

Intraocular and intraorbital pathologic changes can be visualized in the absence of light by the use of pulsed ultrasound. Retinal detachments, tumors, vitreous hemorrhages and radiolucent foreign bodies in light opaque eyes will be shown, as well as orbital tumors. The operation of the device will be explained.

Exhibit S-26

Roentgenologic Studies of the Nasal Sinuses

O. E. VAN ALYEA, M.D., and ROGER A. HARVEY, M.D., Illinois Eye and Ear Infirmary, University of Illinois College of Medicine, Chicago

This exhibit is planned to serve as a comprehensive educational medium for resident training as well as a study for the clinician. It consists of a series of seven panels, beginning with the demonstration of the most widely used projec-

tions delineating the nasal sinuses. Unusual and abnormal developments are shown followed by different stages of acute and chronic sinusitis with demonstrations of progressive steps in their management. Complications of these conditions are visualized. Roentgenograms showing allergic manifestations of the sinuses follow. Trauma of the facial bones is shown, and examples of benign and malignant diseases conclude the presentation.

Exhibit S-27

Use of Diplopia in Orthoptics

AMERICAN ASSOCIATION OF ORTHOPTIC TECHNICIANS, represented by Eva M. DeMars, Patricia O'Neill and Jane Tragus, Philadelphia, and Helen Cason, Omaha

The maintenance of binocular single vision (after careful selection) can be achieved only through the elimination of suppression. Various ways to overcome suppression and the recurrence of squint by the use of diplopia will be demonstrated.

Exhibit S-28

Glutathione Protection of Ocular Tissues Against Ionizing Irradiation

HEINRICH W. ROSE, M.D., School of Aviation Medicine, USAF, Randolph Air Force Base, Texas

The exhibit by the use of photographs, charts and text depicts the protective effects of glutathione treatment of the ocular tissues of animals against ionizing irradiation.

TECHNICAL EXHIBITORS — 1959

Exhibitor	Booth No.
Alcon Laboratories	58 and 59
The Alkalol Co.	29
Allergan Corporation	R-32
Ambco, Inc.	R-25 and R-26
American Bifocal Company, Inc.	SF-751
American Cyanamid Company	R-16
American Optical Co.	7 through 14
Research Laboratory, The American Tobacco Co.	R-17 and R-18
The Armorlite Lens Co., Inc.	R-47
Artificial Human Eyes	R-27 and R-28
Aurex Corporation	R-20
Barnes-Hind Ophthalmic Products, Inc.	R-49
Barnett Optical Laboratories	37
Bausch & Lomb Optical Co.	95 through 102
Rudolph Beaver	R-21
Austin Belgard, Inc.	18 and ½ of 19
Beltone Hearing Aid Company	R-9
Benson Optical Co.	85, 86 and 87
Blakiston Division, McGraw-Hill Book Co.	62
Boll & Lewis Optical Co.	43 and 44
Broemmel Pharmaceuticals	63
Burroughs Wellcome & Co. (U.S.A.), Inc.	120
Cameron Surgical Instruments Co.	76
G. W. Carnrick Co.	SF-757
Chicago Reference Book Co.	R-2

Exhibitor	Booth No.
ClerSite Company	A
The Coca-Cola Company	26
Codman & Shurtleff, Inc.	R-41 and R-42
Contact Lens Society of America	116
Continental Optical Co.	R-15
Coreco Research Corp.	61
Joseph K. Dennis Company, Inc.	51
The DeVilbiss Company	16
Dictograph Products, Inc.	SF-765
Medical Photo Division, Lester A. Dine Company	121
Doho Chemical Corp.	34
Encyclopaedia Britannica	47
Engelhard Industries, Inc.	R-46 and ½ of R-45
Enzytrase, Inc.	SF-749
Ethicon, Inc.	64
Fairfield Optical Co.	SF-787
Grason-Stadler Company	R-36
Grieshaber Swiss Eye Instruments	38
Grune & Stratton, Inc.	35
Guild of Prescription Opticians of America	41 and 42
Harlequin Corporation	6
Paul B. Hoeber, Inc.	32
Hofko Scientific Instrument Co.	SF-748
Hollister-Stier Laboratories	46
The House of Vision, Inc.	65, 66, 67 and 68
Hudson Optical Corp.	109
Industrial Acoustics Co., Inc.	R-37
Ion Optical Company	R-11 and R-12
The Iso-Sol Co., Inc.	R-43
Fritz Jardon Laboratories	R-6
Jenkel-Davidson Optical Company	105 and 107
Keeler Optical Products, Inc.	92 and 93A
Kelley & Hueber, Inc.	R-8
Keystone View Co.	23 and 24
F. & F. Koenigkramer Co.	R-44 and ½ of R-45
Kono Sales Co., Inc.	108
Lea & Febiger	53
Lederle Laboratories Division, American Cyanamid Company	R-10
Liberty Optical Mfg. Co. Inc.	90A
J. B. Lippincott Company	49
P. Lorillard Company	SF-745
Mager & Gougelman, Inc.	20 and ½ of 19
Maico Electronics, Inc.	69 and 70
The S. E. Massengill Co.	SF-747
Matalene Surgical Instruments Co., Inc.	81 and 82
McLeod Optical Company, Inc.	R-48
Medical Case History Bureau	115
Medical Film Guild, Ltd.	L-L
Merck Sharp & Dohme, Division of Merck & Company, Inc.	45
Miller Surgical Co.	89
Modern Optics, Inc.	72 and 73
The C. V. Mosby Co.	88
V. Mueller & Co.	1 through 5
Mueller Welt Contact Lens Laboratory	R-39 and R-40
New Era Optical Co.	R-3 and R-4
Obrig Laboratories, Inc.	110
Omega Instrment Co.	118
Ophthalmos, Inc., Division of Doho Chemical Co.	R-13
Optical Import Co.	SF-756

Exhibitor	Booth No.
The Opticase Company	15
Otarion Listener Corp.	SF-761
Pacific Universal Products Corp.	SF-758
Parsons Optical Laboratories	R-24
George P. Pilling & Son Company	77, 78 and 79
Plastic Contact Lens Co.	R-1 and SF-760
Alfred P. Poll	119
Precision-Cosmet Co.	R-30
W. F. Prior Company, Inc.	106
Professional Pharmacal Co. Inc.	R-33
The Professional Press, Inc.	52
The Purdue Frederick Company	SF-704
Radium Chemical Co., Inc.	30
R. J. Reynolds Tobacco Co.	27 and 28
The Rhinopto Company, Inc.	SF-746
Richards Manufacturing Co.	SF-742
Ritter Company, Inc.	71
Sandoz Pharmaceuticals	R-19
W. B. Saunders Co.	R-35
Schering Corporation	33
Schieffelin & Co.	50
Robert B. Scott	R-34
Shuron Optical Company	83 and 84
Smith, Kline & French Laboratories	R-29
Smith, Miller & Patch, Inc.	R-22
Solex Laboratories, Inc.	SF-764
Sonotone Corporation	80
E. R. Squibb & Sons	R-38
Storck Pharmaceuticals	25
Storz Instrument Company	111 through 114
Surgical Mechanical Research, Inc.	90B and 91
The Thermosector Company	31
Titmus Optical Company, Inc.	R-23
Uhlemann Optical Co.	54 through 57
The Univis Lens Company	39 and 40
Victory Optical Mfg. Co.	103 and 104
Vision-Ease Corporation	60
Dr. Max M. von Stirne	R-7
Walton Laboratories, Inc.	R-14
Warner-Chilcott Laboratories	R-5
Welch Allyn, Inc.	17
White Laboratories, Inc.	R-31
The White-Haines Optical Co.	21 and 22
The Williams & Wilkins Co.	36
Winthrop Laboratories	117
Wyeth Laboratories	SF-703
Carl Zeiss, Inc.	74 and 75
Zenith Radio Corp., Hearing Aid Division	93B and 94
Zylite Products Co., Inc.	48

TECHNICAL EXHIBITS

The Academy is appreciative of the cooperation of all technical exhibitors.

Booths with numbers preceded by "R" are located in the Red Lacquer Room.

Booths with numbers preceded by "SF" are located on the Seventh Floor.

Alcon Laboratories, Fort Worth
Booths 58 and 59

New developments in ophthalmic and rhinologic medication resulting from continuous research exclusively in these fields may be discussed with personnel from Alcon's Research and Sales Departments. Alcon's full line of sterile ophthalmic preparations for prescriptions, office treatment and ocular surgery will be displayed, together with Alcon-efrin, a specially formulated nonstinging, nonirritating nasal decongestant in three strengths.

The Alkalol Co., Taunton, Mass.
Booth 29

The Alkalol Company is featuring Alkalol, a solution especially designed for the treatment of the mucous membranes of the nose and throat.

First compounded in 1896, its balanced formula of salts and essential oils makes a solution that is effective and at the same time nontoxic, mild and pleasant. It is alkaline and a mucus solvent.

Alkalol is an excellent vehicle for many drugs. For further information please call at Booth 29.

Allergan Corporation, Los Angeles
Booth R-32

Ambco, Inc., Los Angeles
Booths R-25 and R-26

The latest developments in fully transistorized audiometers will be on display, including (5) new models. A complete line of audiometers for every use and at every price.

Our line of audiometers includes battery-operated instruments, as well as A. C. power units.

Also on display, for the first time, our completely new line of transistorized speech and auditory training equipment. New portable units, as well as new fixed location instruments will be exhibited.

Competent personnel will be on hand to answer your questions and offer help, including custom engineered requirements.

American Bifocal Company, Inc., Cleveland
Booth SF-751

American Cyanamid Company, Surgical Products Division, Danbury, Conn.
Booth R-16

AMERICAN CYANAMID COMPANY SURGICAL PRODUCTS DIVISION, 1 Casper Street, Danbury, Conn., manufacturers of DAVIS & GECK SUTURES in the new Surgilope SP Sterile Strip Pack with Atraumatic Needles; VIM HYPODERMIC NEEDLES and SYRINGES. Other specialties include SURGAIRE—sterile deodorant spray ointment, TOPASIL—silicone skin protectant, CURON—elastic foam bandage, DISPOSABLE NEEDLES AND SYRINGES, and Blood Lancets.

American Optical Co., Southbridge, Mass.
Booths 7 through 14

Research Laboratory, The American Tobacco Company, Richmond, Va.
Booths R-17 and R-18

This exhibit features a display in full color depicting the growing and processing of tobacco.

Representatives from the Research Laboratory will be in attendance and will welcome your questions on the role of research and control in the manufacture of quality cigarettes by The American Tobacco Company.

Technical literature will be available for distribution.

The Armorlite Lens Co., Inc., Pasadena, Calif. Booth R-47

The Armorlite Lens Company, developers of durable hard resin lenses, will demonstrate the wide range in which light-weight, safe lenses are now available.

These will include examples of the safest of all lenses for children, athletes and industrial workers; of feather-weight aphakic bifocals, and of ultraviolet absorbing hard resin lenses. Ultraviolet absorbing lenses are crystal white and more perfectly transparent than glass to all light useful in seeing, yet they totally absorb all deleterious ultraviolets.

Artificial Human Eyes, Newark, N. J. Booths R-27 and R-28

Joint exhibitors in this booth are E. & S. Danz, New York; G. Danz & Sons, San Francisco; Richard Danz & Sons, New York; Erickson Laboratories, Seattle; Erickson Laboratories, Spokane; Greiner & Mueller, Chicago; L & B Laboratories, Inc., Fort Lauderdale; Hugo Leipold, Pittsburgh, and Earle C. Schreiber, Inc., Newark, N. J.

This exhibit of Artificial Human Eyes will include color photos of unusual cases. An implant and conformer for every type and preference will also be found here, and we shall repeat an exhibit of causes of frequent "unsolvable" irritations from ocular prostheses. We will also be on hand to discuss individual fitting problems with sincerity and humility.

Aurex Corporation, Chicago Booth R-20

Barnes-Hind Ophthalmic Products, Inc., Sunnyvale, Calif. Booth R-49

Barnett Optical Laboratories, Chicago Booth 37

Bausch & Lomb Optical Co., Rochester, N. Y. Booths 95 through 102

The Bausch & Lomb exhibit will feature a new ophthalmic chair designed to give the doctor maximum control of the patient by positioning him comfortably, and maintaining that position. Also on display will be the Thorpe Slit Lamp fitted with an Aplanation Tonometer whereby tonometry becomes a routine examination within the usual slit lamp microscopy. A new lightweight goniomicroscope will be shown. The latest B&L ophthalmic lenses and frames for dress, work, and play will be given prominence. Safety eyewear that both looks well and affords eye protection—in increasing demand by industry—will highlight B&L's display.

Rudolph Beaver, Waltham, Mass. Booth R-21

Austin Belgard, Inc., Chicago Booths 18 and ½ of 19

Beltone Hearing Aid Company, Chicago Booth R-9

Benson Optical Co., Minneapolis Booths 85, 86 and 87

Benson Optical Company will have information on contact lenses, the new Younger invisible bifocal, plastic lenses, and various types of lenses for the unusual, complicated prescriptions, the new All American Athletic frames, and other special items for special purposes. (There will be a complete complement of frames for women, children, and men, including custom designs and colors obtained through the new color-fuse process.) Complete Professional Suite room and dispensing room equipment on hand for your examination and discussion.

Blakiston Division, McGraw-Hill Book Co., New York Booth 62

The Blakiston Division of McGraw-Hill Book Company will exhibit the following books: Paton's KERATOPLASTY, which presents modern techniques and data in the whole field of keratoplasty; Paton, Katzin, and Stilwell's ATLAS OF EYE SURGERY, a new visual approach to eye surgery using 464 line drawings to show step-by-step procedures for operating techniques; McAuliffe's PRACTICAL OTOLARYNGOLOGY; Sataloff's INDUSTRIAL DEAFNESS; Harrison, Adams, Bennett, Resnik, Thorn, and Wintrobe's PRINCIPLES OF INTERNAL MEDICINE, 3rd edition; and BLAKISTON'S NEW GOULD MEDICAL DICTIONARY, 2nd edition.

Boll & Lewis Optical Co., Chicago Booths 43 and 44

Broemmel Pharmaceuticals, San Francisco Booth 63

BRO-PARIN and OP-PARIN, new and unique rationales for the treatment of refractive cases of ear and eye infections. The HEPARIN-ANTIBIOTIC - STERIOD complex is dramatically successful in topical treatment of cases which heretofore have proved to be enigmatic. BRO-PARIN has provided rapid relief in chronic cases of otitis externa and media and in eczematous conditions. OP-PARIN is indicated for combating stubborn bacterial infections and has been successful in the healing of corneal ulcers. Attending physicians are cordially invited to the exhibit for information, samples and literature.

Burroughs Wellcome & Co. (USA), Inc., Tuckahoe, N. Y. Booth 120

NEW PRODUCTS

The extensive research facilities of "B. W. & Co.," both here and in other countries, are directed to the development of improved therapeutic agents and techniques. Much basic theoretical work in our laboratories and in cooperation with internationally known institutions is contributing to the reservoir of fundamental medical knowledge.

Through such research "B. W. & Co." has made notable advances related to leukemia, malaria, diabetes, and diseases of the autonomic nervous system; and to antibiotic, muscle-relaxant, antihistaminic, and antinauseant drugs.

An informed staff at our booth will welcome the opportunity to discuss our products and latest developments with you.

Cameron Surgical Instruments Co., Chicago Booth 76

This year the Cameron booth is, as usual, showing the very latest developments in the way of better instruments for the doctor.

"Cooling" of the headlite has been a difficult but very necessary problem for years. "Cameron" has solved that problem and without sacrificing illumination. See it!

The Cameron Company originated the radio knife (true radio frequency) and today—like the transistor—a smaller machine does a "bigger" job. See this new small machine.

All worth your time.

G. W. Carnrick Co., Newark, N. J. Booth SF-757

The G. W. Carnrick Company display will feature NOLAMINE, the new oral nasal decongestant available as a timed-release tablet. The new tablet has been especially designed to provide continuous relief up to eight or ten hours from a single dose. NOLAMINE incorporates two antihistamines . . . chlorprophenpyridamine maleate and phenindamine tartrate . . . with a long-acting oral vasoconstrictor, phenylpropanolamine. Animal studies have demonstrated a true synergistic action from the combination of these ingredients.

Clinically, NOLAMINE has proven 92.3 per cent effective in relieving nasal congestion and allergic conditions associated with hay fever, sinusitis, allergic and infectious rhinitis, and the common cold. There is virtually no sedation, stimulation or other undesirable side effect with NOLAMINE.

Chicago Reference Book Co., Chicago Booth R-2

ClerSite Company, Chicago Booth A

The Coca-Cola Company, Atlanta Booth 26

Ice-cold Coca-Cola served through the courtesy and cooperation of the Coca-Cola Bottling Company of Chicago, Inc., and The Coca-Cola Company.

Codman & Shurtleff, Inc., Boston Booths R-41 and R-42

Codman & Shurtleff, Inc., makers of surgeons' fine instruments since 1838, will exhibit their line of fine eye instruments, including the Beaver eye knives with detachable blades and a complete line of ear, nose and throat instruments.

Contact Lens Society of America, Philadelphia Booth 116

The Contact Lens Society of America,

In its fifth year, will display a map showing the locations of its members. A booklet on the HISTORY OF CONTACT LENSES and other literature will be available to the members of the Academy. Members of the Society manning the booth will be ready to give information and answer questions about the Society and its members and discuss new developments in the field of contact lens fitting.

Continental Optical Co., Indianapolis
Booth R-15

Coreco Research Corp., New York
Booth 61

The Coret Camera embodies the principle of electronic flash and constant automatic control of such factors as distance, aperture, field, and exposure. Now, for the first time, Coreco offers a completely automatic professional clinical camera purposely designed to achieve the ultimate in surface, intra-oral, and intratubular photography. Because of the simplicity of operation, even an inexperienced doctor or nurse can achieve consistently perfect color transparencies.

Joseph K. Dennis Company, Inc., Chicago
Booth 51

The AAOO Group Insurance Administrators (Joseph K. Dennis Company, Inc.) will be available in booth 51 to counsel with members concerning their membership privileges.

The DeVilbiss Company, Somerset, Pa.
Booth 16

The DeVilbiss Company cordially welcomes the members of the American Academy of Ophthalmology and Otolaryngology to visit its exhibit of Atomizers, Nebulizers, Vaporizers and related aerosol therapy equipment. DeVilbiss representatives will be pleased to discuss and answer any questions relating to the complete DeVilbiss line of equipment on display.

Dictograph Products, Inc., Jamaica, N. Y.
Booth SF-765

Medical Photo Division, Lester A. Dine Company, Levittown, N. Y.
Booth 121

Featuring inexpensive photographic equipment for Ophthalmology and Otolaryngology picture taking. Including the new sensational Kodak Startech Camera that has become a "must" for the novice photographer. The wonderful Electronic Fundus Camera made by Optiques et Precision of France will also be on exhibit.

Doho Chemical Corporation, New York
Booth 34

Doho Chemical Corporation is pleased to exhibit:

AURALGAN—Otitis media and removal of cerumen.

OTOSMOSAN—Fungicidal and bactericidal in the suppurative and aural dermatomycotic ears.

RHINALGAN—Nasal decongestant free from systemic or circulatory effect.

LARYLGAN—Throat spray and gargle for infectious and noninfectious sore throat involvements.

Encyclopaedia Britannica, Chicago
Booth 47

A great new edition of the Encyclopaedia Britannica and its correlated fact finding and research services will be on display at this meeting.

To those who may be interested in acquiring Britannica, there is available a special exhibit discount.

Whether your interest is current or for the future, please visit our booth.

You need not invest to investigate.

Engelhard Industries, Inc., Elmhurst, L. I., N. Y.
Booths R-46 and ½ of R-45

Visitors to the Engelhard Booths (in the Red Lacquer Room) will see an excellent display of a wide variety of E. N. T. diagnostic instruments that are noted for quality, practicality and moderate cost. Some instruments on display are of recent development. Fully qualified representatives will gladly provide painstaking demonstrations of the full range of

instruments, including the new DIAGNOSTOR, the desk-top controller that provides unmatched convenience for the use of ophthalmoscope, otoscope and other illuminated diagnostic aids. Ideal for all E. N. T. men.

Enzytrase, Inc., New York
Booth SF-749

Ethicon, Inc., Somerville, N. J.
Booth 64

Electron Sterilized surgical gut . . . stronger, more pliable, easier to handle, and new easy-open foil suture packages are featured. Exclusive Collagen Pure, Tru-Chromicized, Tru-Gauged properties of ETHICON surgical gut will be demonstrated, as well as a complete line of ATRALOC Needle Sutures for every surgical need. Tru-Permanized Surgical Silk and Surgical Cotton, along with other surgical specialties, will also be shown.

Fairfield Optical Co., Mansfield, Mass.
Booth SF-787

The name FAIRFIELD in eyewear is like Tiffany in silverware.

In Room 787 you can relax and enjoy a review of Fairfield's recent creations in ladies' and men's impressive eyewear.

FAIRLADY—FAIRLITE—FAIRMAID

Suggested for Milady's wardrobe.

The snappy but refined Kingfield man's frame is definitely on the call.

Fairfield creations are admired for their original designs but definitely demanded by the ophthalmologist because of their ease of adaptation to the patient's prescription.

Grason-Stadler Company, West Concord, Mass. **Booth R-36**

Grieshaber Swiss Eye Instruments, Chicago **Booth 38**

For those who appreciate the finest in Ophthalmic Instruments we will display exclusive GRIESHABER patterns of EYE KNIVES, CORNEAL SUTURE NEEDLES, TREPHINES, and extremely delicate FORCEPS and NEEDLE HOLDERS.

Well known for their superlative cutting qualities, GRIESHABER EYE INSTRUMENTS and CORNEAL NEEDLES are made of a very special stainless steel which holds the original keen cutting edge.

New instruments by Dr. Barraquer will be shown. A new stronger number 10-0 pure Virgin Silk, such as used with our finest Barraquer needles will be displayed. Incidently, this suture does not have to be removed.

We take this opportunity to thank our many friends of the American Academy of Ophthalmology and Otolaryngology for their loyal support throughout the years and extend our invitation to all members to visit our display.

Grune & Stratton, Inc., New York
Booth 35

Guild of Prescription Opticians of America, Inc., New York
Booths 41 and 42

Adjustment of glasses and minor repairs will be continuously available for the convenience of Academy members and guests who may need this service. Guild materials in support of medical eye care will be on display.

Harlequin Corporation, New York
Booth 6

Harlequin Corporation will present latest fashion eyewear featuring new seasonal colors and designs created to tie in with latest fashion trends.

Paul B. Hoeber, Inc., New York
Booth 32

Among the many important books on display will be Pack & Ariel's TREATMENT OF HEAD & NECK CANCER, second edition. Other books of particular interest to members of the Academy will include Hollinshead's SURGICAL ANATOMY OF THE HEAD & NECK, Martin's SURGERY OF HEAD & NECK TUMORS, and Sugar's GLAUCOMAS, second edition. You will also be interested in Ellis' MODERN TRENDS IN EAR, NOSE & THROAT DISEASES, as well as the second edition of DeJong's NEUROLOGIC EXAMINATION. All Hoeber-Harper books will be on display, and you are cordially invited to browse at your leisure.

Hofko Scientific Instrument Co., New York **Booth SF-748**

The "NEW TABLE" instrument table, for ophthalmologic examinations and diagnosis, for uninterrupted, continuous operation, complete practice in one loca-

tion. Eliminates changes in position of instruments or walking from one instrument to another. Reduces fatigue.

T-form arrangement of table—instruments on moving platforms—automatic low voltage adjustment—push button control—regular voltage connections of any electric accessories and equipment.

Designed and developed in West Germany to function as control center in modern practice of ophthalmology. Saves space, time, effort for busy doctor—conserves energy for other important work—provides comfort for doctor and patient. All instruments on one table.

Hollister-Stier Laboratories, Philadelphia
Booth 46

Members of our technical service staff will be in attendance at the exhibit to discuss important special antigens and their application. Antigens of special interest to the members of the American Academy of Ophthalmology and Otolaryngology will be the mold, stinging insect antigens, bacterials, and of course pollen extracts, epidermals, and miscellaneous antigens that are so important in upper respiratory allergies.

The House of Vision, Inc., Chicago
Booths 65, 66, 67 and 68

The House of Vision will demonstrate the great new Haag-Streit Slit Lamp 900 with its many new and unusual features.

Also we will still exhibit the original Goldmann Slit Lamp and the Goldmann Aplanation Tonometer.

A complete line of foreign and domestic equipment, featuring the greatest factory names in the world, will be displayed.

Zeiss equipment: Zeiss Oberkochen Slit Lamp, Zeiss Refractionometers, Zeiss Fundus Camera—and more.

Orthoptic equipment, field equipment, contact lens equipment, diagnostic equipment, refraction equipment—all will be shown.

Our display will include the latest in technical optics and fashionable frame styling.

Hudson Optical Corp., Long Island City, N. Y. **Booth 109**

Industrial Acoustics Co., Inc., New York
Booth R-37

The Industrial Acoustics Company will exhibit an I. A. C. Standard Model "400" Audiometric Testing Room. The Series "400" was designed for clinical, industrial and armed services audiometry, and these are the most widely used rooms in the country today. The features which make these rooms unique in their field will be displayed.

We will also have available our recently published brochure entitled "Examination and Research Rooms for the Medical Profession," which contains complete technical data on our Series "400," "400-CT" and "1200" Rooms, the most complete line of Audiometric Testing Rooms available in the country today.

We would be pleased to have you stop in at our booth to discuss any questions you may have with regard to I. A. C. Rooms.

Ion Optical Company, Detroit
Booths R-11 and R-12

The Iso-Sol Co., Inc., Lindenhurst, N. Y.
Booth R-43

Fritz Jardon Laboratories, Detroit
Booth R-6

Jenkel-Davidson Optical Company, San Francisco **Booths 105 and 107**

You are invited to inspect specialized equipment and accessories designed and manufactured by Jenkel-Davidson Optical Company. The exhibit will include the latest model of the Clinicamera, Multiple Pattern Screener, Trial Lens Cabinet, Selectachart, Electrajust and other convenient accessories for the ophthalmologist.

Keeler Optical Products, Inc., Philadelphia **Booths 92 and 93A**

The FISON BINOCULAR INDIRECT OPHTHALMOSCOPE provides brilliant illumination, fully stereoscopic vision; it is lightweight and comfortable. An accessory Reflector, enabling two doctors to view simultaneously, is also valuable for teaching.

The lightweight SPOTLIGHT ATTACHMENT for the Keeler Magnifying Spectacle gives intense shadow-free illumination.

A new De Luxe Combination Set comprises the "Practitioner" Ophthalmoscope plus the WIDE-ANGLE OTOSCOPE, featuring all-nylon specula, 3.5 or 6 power telescopic magnification, ample operating space, brilliant light and low cost.

The FOREIGN BODY LOCATOR is compact and portable. It discriminates between ferrous and nonferrous metals. Highly accurate detection and localization are unaffected by other metals nearby.

Kelley & Hueber, Inc., Philadelphia
Booth R-8

Keystone View Co., Meadville, Pa.
Booths 23 and 24

At the Keystone View Company's exhibit the featured item will be the new Professional Orthoscope Tests which have many advantages for the ophthalmologist (1) in assessing binocular functioning factors, (2) in determining the most comfortable bifocal add and (3) in determining or rechecking the sphere, axis and power of the cylinder.

The new Keystone Tests for Aniseikonia will be available for demonstration. Also a new diagnostic anaglyphic type series of tests will be shown for the first time.

The Keystone Tachistoscope widely used for perceptual training in industries and in schools and colleges will be demonstrated. Keystone prescriptions for orthoptic home training will be on display.

F. & F. Koenigkramer Co., Cincinnati
Booths R-44 and ½ of R-45

Kono Sales Co., Inc., Woodside, N. Y.
Booth 108

The Kono Manufacturing Company, Inc., will exhibit their regular line of cosmetic ophthalmic frames and as usual use this meeting to launch several new styles developed under their unique Progressive Styling program.

Experts will also be in attendance using representative samples to answer questions involving such special fitting problems as diplopia, ptosis, and strabismus.

Lea & Febiger, Philadelphia Booth 53

Lea & Febiger invites you to examine the many books of interest to members of the American Academy of Ophthalmology and Otolaryngology. Be sure to see Cushman—STRABISMUS; Town—OPHTHALMOLOGY; Spaeth—OPHTHALMIC SURGERY; Joslin—TREATMENT OF DIABETES MELLITUS; MacNeal, Alpers and O'Brien—HEADACHE; Ballenger and Ballenger—DISEASES OF THE NOSE, THROAT AND EAR; Krimsky—BINOCULAR IMBALANCE; Ballenger and Ballenger—A MANUAL OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY; Cowan—REFRACTION OF THE EYE; Gifford—OCULAR THERAPEUTICS; Wohl and Goodhart—MODERN NUTRITION IN HEALTH AND DISEASE; Bonica—THE MANAGEMENT OF PAIN; and others. Also, be sure to take this opportunity to examine the new twenty-seventh (centennial) edition of Gray's ANATOMY.

Lederle Laboratories Division, American Cyanamid Company, Pearl River, N. Y. Booth R-10

Liberty Optical Mfg. Co., Inc., Newark, N. J. Booth 90A

J. B. Lippincott Company, Philadelphia
Booth 49

J. B. Lippincott Company presents, for your approval, a display of professional books and journals geared to the latest and most important trends in current medicine and surgery. These publications, written and edited by men active in clinical fields and teaching, are a continuation of more than 100 years of traditionally significant publishing.

P. Lorillard Company, New York
Booth SF-745

P. Lorillard Company invites you to visit the Kent Cigarette Exhibit.

We are presenting the Story of Kent Cigarettes with the exclusive, new Micronite filter, which gives you rich taste with less tars and nicotine in the mainstream smoke than any other leading filter brand.

A table cigarette box with your signature in gold will be a pleasant souvenir of your visit to the convention.

Mager & Gougelman, Inc., Chicago
Booths 20 and ½ of 19

Complete Artificial Eye Service, Facial Restorations and Precorneal Lenses. Our skilled glass and plastic eyemakers are heirs to our 107 years of experience. We have offices in many principal cities, and we visit other localities regularly for the fitting of artificial eyes.

We provide extensive mail order service for doctors who must do their own fittings. FREE COLOR CHART AND SIZE GUIDE available at our booth, where you are also invited to see our implants, conformers, artificial eyes, anatomical eye models, facial restorations and precorneal lenses.

We will welcome the opportunity of discussing with you any artificial eye or lens problems you may have.

Maico Electronics, Inc., Minneapolis
Booths 69 and 70

Maico Electronics, Inc., pioneer Minneapolis hearing research and manufacturing firm, will introduce an entirely new two-channel audiometer, one of the most complete and precise hearing test instruments ever developed for clinical use. Also shown will be the "world's smallest audiometer"—the new Maico two-frequency, hand hearing-check instrument. Those in attendance will have the opportunity to have their hearing tested by the Rudmose automatic audiometer, which will be coupled to a Maico Audiometric Enclosure to permit testing during exhibit hours. Maico personnel will be pleased to discuss audiometric techniques and problems with Academy members.

The S. E. Massengill Co., Bristol, Tenn.
Booth SF-747

Matalene Surgical Instruments Co., Inc., New York **Booths 81 and 82**

Matalene Surgical Instruments Co., Inc., will exhibit an improved binocular gonioscope with coaxial illumination, the Chamlin perimeter, tonometers, trial frames, and the newest developments in forceps scissors, cutting instruments, instrument cases, etc., as well as the standard patterns.

McLeod Optical Company, Inc., Providence, R. I. **Booth R-48**

Medical Case History Bureau, New York
Booth 115

Simplifying the Doctor's History Record and Bookkeeping System with the INFO-DEX RECORD CONTROL SYSTEM.

Maintenance of accurate, informative data on both history and financial records is essential in the modern doctor's practice. The INFO-DEX Record Control System helps to keep a constant finger on the physical and financial status of the patient. This system correlates information almost automatically for instant reference and research work. The method of cross-indexing interesting cases according to the disease is unique and exclusive.

The MEDICAL CASE HISTORY BUREAU of New York City has specialized for many years in record forms for the doctor's office. Its well-informed representative will gladly demonstrate the INFO-DEX System and discuss your office problems.

Medical Film Guild, Ltd., New York
Booth L-L

Merck Sharp & Dohme, Division of Merck & Company, Inc., Philadelphia
Booth 45

A new and very promising adrenocortical steroid is featured at the Merck Sharp & Dohme booth. 'DECADRON' dexamethasone possesses all the basic actions and effects of other glucocorticoids but in different degree. Its anti-inflammatory activity is more potent on a weight basis than any other known glucocorticoid. Electrolyte imbalance is not ordinarily a therapeutic problem. Neither abnormal salt and water retention nor potassium excretion are discernible in most patients receiving therapeutic dosages. In other respects also, 'DECADRON' is generally well tolerated.

'HydroDIURIL', a new, orally effective, nonmercurial diuretic - antihypertensive agent is also of interest. This compound is the most potent diuretic agent presently available, equaling or exceeding even the most potent parenteral organomercurials in diuretic activity. Like 'DIURIL', the principal action of 'HydroDIURIL' is a marked enhancement of the excretion of sodium and chloride.

Technically trained personnel will be present to discuss these and other subjects of clinical interest.

Miller Surgical Co., Chicago Booth 89

See the Miller Electro-Scalpel and other electrosurgical units with Snares, Suction-Coagulation attachments, and other special accessories for eye, ear, nose and throat procedures. These cutting, coagulating and desiccating units, with or without spark gap, are calibrated to do the most delicate work as well as light major surgery of the eye, ear, nose and throat. There will also be on display illuminated otoscopes, eyespud with magnet, ophthalmoscope, transilluminating lamps, Lempert-type Headlite, and other specialties.

Modern Optics, Inc., Houston, Texas Booths 72 and 73

Modern Optics will display a new lens process, whereby a uniform-density gray or green lens for high myopes or high hyperopes now can be made just as thin, just as light, as a white lens. This new process is available in the flat-top seg bifocal and in the monocentric seg 3-Way or trifocal.

Also, Modern Optics will display the new 37 per cent transmission neutral gray for the "in-and-outer" patient. The 19 per cent transmission neutral gray, for the "stay-outer" patient, also will be shown in the "bar" or "ribbon" seg bifocal for farmers, hunters, construction men.

The C. V. Mosby Co., St. Louis Booth 88

V. Mueller & Co., Chicago Booths 1 through 5

Demonstrations of the improved Mueller MC Electronic Tonometer and the new Mueller Electronic Tonographer, as well as other recording equipment and accessories, will be a major feature of the interesting V. Mueller & Company displays. The Zeiss-Shambaugh-Derlacki Operation Microscope with observation tubes and a most comprehensive line of instruments for stapes mobilization, tympanoplasty, myringoplasty, fenestration and related procedures will also highlight a practical collection of fine standard and special instruments for all eye, ear, nose, throat and bronchoscopic work. V. Mueller instrument specialists will be on hand to welcome your instrument problems.

Mueller Welt Contact Lens Laboratory, Chicago Booths R-39 and R-40

Success with the Tricon lens is greater than ever with the inclusion of the bevatic edge. Demonstrations will be given again this year, as usual, at our booths. Our laboratory will be open for your inspection three days before and after the Academy meeting, where observations of patients can be made.

New Era Optical Co., Chicago Booths R-3 and R-4

Obrig Laboratories, Inc., New York Booth 110

The Obrig Laboratories will present the various types of contact lenses as well as diagnostic and gonioscopic lenses.

Literature and reprints of articles will be available. Arrangements may be made for instruction in the fitting of contact lenses.

Omega Instrument Co., New York Booth 118

Ophthalmos, Inc., Division of Doho Chemical Co., New York Booth R-13

You are cordially invited to visit our exhibit booth.

We will be featuring—

The STER I DROPPA in its new container.

The STER I DROPPA is a sterile single dose disposable unit containing Ophthalmos solutions for surgery. This new container is made from revolutionary new plastic material—clear as crystal—electronically sealed—absolutely impermeable and unaffected by liquids and gases and is autoclaved. (Steam sterilized at 250 degrees—20 minutes.)

We will also feature—

ALMOCARPINE—Ophthalmos solution of Pilocarpine Hydrochloride

EPITRATE—Epinephrine Bitartrate 2%

VAS I ZINC—Zinc Sulfate ¼ %

METHISOL—Methylcellulose 4000 cps. ½ %

FLUOR I STRIP—sterile disposable single dose fluorescein applicators

Our staff of trained representatives will be available to discuss with you the uses of these preparations in addition to other products for ophthalmic therapy and diagnosis.

Our Director of Research, Mr. Robert R. Feinstein, will be in attendance to discuss with you the various projects which are now under research and investigation. Among these will be an Anhydrous Hypertonic Glycerol for the reduction of corneal edema.

Information on our progress with a new nonanesthetic antipruritic agent for the relief of ocular itching due to allergies, hay fever, etc., will also be available. He will also be happy to discuss any pharmacologic problems arising from the use of ophthalmic medications.

Optical Import Co., Bellingham, Wash. Booth SF-756

Optical Import Company will display the latest imported ophthalmic instruments and equipment. The exhibit will include the new Gambs Slit Lamp and the new Javal Ophthalmometer. The latest developments in Pleoptics will also be demonstrated, including the Oculus Synoptophore, the Euthoscope, and the Visuscope. The powerful Oculus Giant Magnet will be available, as well as a new imported Deluxe Refracting Unit. Optical Import Company manufactures and imports the finest ophthalmic instruments and equipment.

The Opticase Company, Newark, N. J. Booth 15

Otarion Listener Corp., Ossining, N. Y. Booth SF-761

Otarion Listener Corporation demonstrates the advantages of Direct Frontal Hearing—achieved by a minute microphone in front frame of eyeglasses. On display by the manufacturers of the original hearing aid built into eyeglasses is a complete line of Listener eyeglass hearing aids, including bilateral, binaural, bone conduction, single temple and telephone pickup types. Other features are tiny at-the-ear instruments and conventional aids and demonstration of the "one unit" combination puretone and speech audiometer.

Pacific Universal Products Corp., Pasadena Booth SF-758

We plan to exhibit fully coated samples as well as half-coated samples of Lestro-Lite, anti-reflection; Mira-Lite, front surface metallic; Gradient Density, graduated metallic both single and/or gradient; Absorptive Tints, Shades 1 and 2; Absorptive Tones, Shades 3 and 4, and other coating specialties including contact lens mirror.

Parsons Optical Laboratories, San Francisco Booth R-24

Parsons Optical Laboratories, the world's largest manufacturers of glaucoma equipment, will show (1) both diagnostic and surgical instruments in that field, including the Barkan-Koeppe lens and the Barkan goniotomy lens; (2) floor model gonioscopes, hand-held microscopes, the Barkan focal illuminator and operating light, and a complete display of tonometers; (3) other items of our exclusive manufacture, such as the Costenbader accommodometer and the Costenbader adjustable clip-on trial frame, Harrington pocket charts, Engel fundus contact lens, Thorpe fundus lens, and Thorpe x-ray localization lens; (4) some equipment by Haag-Streit, whom Parsons represents as West Coast distributors.

George P. Pilling & Son Company, Philadelphia Booths 77, 78 and 79

Pilling features their newly designed, improved Tonometer which has many ex-

clusive features. Jeweled bearings, perfect balance, ventilated footplate and a new type of handle, resulting in better control of the instrument and easier, more accurate reading.

The Jackson Fotoendoscopic Unit is an important feature shown in the Pilling line of instruments for Bronchoesophagology.

Plastic Contact Lens Co., Chicago
Booths R-1 and SF-760

A complete display of all types of contact lenses, including those specifically designed for the fitting of keratoconus, aphakia and subnormal vision. Professionally accepted SPHERCON as well as BICON (bifocal contact lenses) will also be shown. In addition, all contact lens instrumentation and supplies will be available.

The new Wesley/Jessen Instructual Manual will be given gratis upon request.

Alfred P. Poll, New York **Booth 119**

Precision-Cosmet Co., Minneapolis
Booth R-30

W. F. Prior Company, Inc., Hagerstown, Md. **Booth 106**

A UNIQUE AND INDISPENSABLE SERVICE FOR THE OTOLARYNGOLOGIST

In addition to the LOOSE-LEAF OTOLARYNGOLOGY and the vast number of new and revised chapters that have already been published for these volumes, you will see on display the unique OTOLARYNGOLOGY RESEARCH SERVICE. The actual requests from subscribers, the response by way of literature supplied, and the reactions of the individual subscribers will prove how valuable this service would be to you.

Gone are the days when it was necessary for the busy specialist to spend valuable time hunting for needed references. By merely mailing a request card, the literature completely answering your question is placed on your desk.

This service is vast in its comprehensiveness and negligible in its cost.

Professional Pharmacal Co., Inc., San Antonio **Booth R-33**

The Professional Pharmacal Company will display its complete line of BufOpto Ophthalmic Solutions.

Two NEW superb BufOpto ophthalmic solutions will be featured. BufOpto VERNACEL is a sterile decongestant and antihistaminic ophthalmic solution that provides prompt, effective relief in hay fever, vernal conjunctivitis, and many allergies. This solution contains no dangerous steroids.

BufOpto EFRICEL-10% is a stable ophthalmic solution containing Phenylephrine Hydrochloride-10%. This unique preparation, the result of four years of research and testing, will not darken or discolor on long standing.

All BufOpto Ophthalmic Solutions will be featured in the New All-Plastic package that permits inspection of the contents of the package at all times.

Our special representatives will be on hand to answer any questions concerning these products.

The Professional Press, Inc., Chicago
Booth 52

The Eye, Ear, Nose and Throat Monthly is now in its thirty-eighth year of publication. Its constant aim is to provide profitable reading of a practical nature for those engaged in the eye, ear, nose and throat field.

The Purdue Frederick Company, New York **Booth SF-704**

The Purdue Frederick Company will present:

PROBILAGOL: Liquid cholecystokinetic for the dynamic therapy of biliary tract diseases. Contains d-glucitol and hematropine methylbromide, acting by contracting the gallbladder and relaxing the sphincter of Oddi.

SENOKOT: Constipation corrective. Concentrated total senna glycosides which activate Auerbach's plexus, initiate normal neuroperistalsis.

SENOKAP: Produces timed stool softening and elimination by the addition of dioctyl sodium sulfosuccinate to Senokot.

SENOBILE: Utilizes the peristaltic action of bile salts with Senokot.

SENOKOT WITH PSYLLIUM: Adds the bulk effect of psyllium to Senokot.

CERUMENEX: A cerumenolytic for the easy and quick removal of excessive cerumen. Nonirritating and nonsensitizing. Contains Cerapon, a new surfactant, with propylene glycol as carrier and chlorbutanol as preservative.

Radium Chemical Co. Inc., New York
Booth 30

Radium Chemical Company, Inc., will display the Monel metal radium nasopharyngeal applicator, used for the treatment of hyperplastic lymphoid tissue at the orifice of the eustachian tube and the fossa of Rosenmueller. A complete line of instruments for the application of radon will also be shown.

R. J. Reynolds Tobacco Co., Winston-Salem, N. C. Booths 27 and 28

The Rhinopto Company, Inc., Dallas
Booth SF-746

Richards Manufacturing Co., Memphis
Booth SF-742

Ritter Company, Inc., Rochester, N. Y.
Booth 71

Ritter Equipment enables the ear, nose and throat specialist to treat **more** patients **more** thoroughly with **less** effort in **less** time.

Featuring the ever popular Ritter Ear, Nose & Throat Treatment Unit, which places all of the essential electrical, vacuum and pressure treatment facilities instantly right at your finger tips.

The NEW Ritter Motor Chair, providing greater patient comfort and a full 18 inch effortless elevation from extreme low to high position; also a special motor-elevated Chair-Table designed especially for eye, ear, nose and throat work.

Plan to spend some time at the Ritter Exhibit, and let us explain the many benefits to be derived from a lifetime investment in efficient Ritter equipment.

Sandoz Pharmaceuticals, Hanover, N. J.
Booth R-19

Sandoz Pharmaceuticals cordially invites you to visit our display.

BELLERGAL Space Tabs assure around-the-clock control of functional complaints (example—menopause symptoms) in the periphery where they originate.

SANDOSTENE Space Tabs: around-the-clock control of itching and hay fever.

BepHAN Space Tabs: a new approach to prolonged maintenance of low gastric acidity.

Our representatives in attendance will gladly answer questions about these and other Sandoz products.

W. B. Saunders Co., Philadelphia
Booth R-35

New Saunders titles of special interest include: Jackson & Jackson: Diseases of the Nose, Throat and Ear; Terracol & Sweet: Diseases of the Esophagus; Boies: Otolaryngology; Fasanella: Eye Surgery; Adler-Gifford: Ophthalmology; and Shambaugh: Surgery of the Ear.

Schering Corporation, Bloomfield, N. J.
Booth 33

Schieffelin & Co., New York Booth 50

Robert B. Scott, Chicago Booth R-34

1. Display of before and after results on ocular prostheses, cosmetic contact shells and facial restorations.

2. Display of retinal and anterior segment slides from our collection.

Shuron Optical Company, Geneva, N. Y.
Booths 83 and 84

The Shuron Optical Company Division of Textron Inc. will display its complete line of quality frames and cases. Its representatives will be glad to explain and demonstrate the importance of correctly designed and constructed ophthalmic frames, and why special lenses for occupational and sports wear should be prescribed by the doctor. Included will be the combination Ronsir and Rondon Browline frames—both in zylonite and high purity aluminum, the all zyl Rondean in solid colors and clear bridge, Widesite Corrected Curve lenses in White, Tonetex, Greentex, Neutrex and

DS (Dress Safety), and the newest in spectacle cases.

Smith, Kline & French Laboratories, Philadelphia Booth R-29

S. K. F. features (1) Temaril Tablets and Syrup, the oral medication specifically for the relief of itching, both mild and severe; (2) Teldrin Spansule capsules, for rapid and sustained antihistaminic effect; (3) Compazine, the tranquilizer and antiemetic with minimal side effects; and (4) Thorazine, one of the fundamental drugs in medicine. Our representatives welcome the opportunity to discuss S. K. F. products with you and are ready always to be of help in any way they can.

Smith, Miller & Patch, Inc., Stoneham, Mass. Booth R-22

Solex Laboratories, Inc., Los Angeles Booth SF-764

Sonotone Corporation, Elmsford, N. Y. Booth 80

In addition to the current line of Sonotone hearing aids to be exhibited will be a new model. Outstanding in this instrument will be its versatility in meeting the needs of hearing losses ranging from slight to severe. A new automatic gain control system permits weak and distant sounds to be clearly heard, yet automatically prevents nearby sounds, no matter how loud, from causing discomfort to even "tender" ears. In addition the Model 91 series of diagnostic and screening audiometers will be shown.

E. R. Squibb & Sons, New York Booth R-38

E. R. Squibb & Sons has long been a leader in the development of new therapeutic agents for prevention and treatment of disease. The results of our diligent research are available to the medical profession in new products or improvements in products already marketed.

At booth R-38, we are pleased to present up-to-date information on these advances for your consideration.

Storck Pharmaceuticals, St. Louis Booth 25

ECTASULE—a timed-action capsule of ephedrine and ambarbital for 12-hour relief of allergies such as asthma, hay fever, rhinitis and sinusitis without any side effects.

METALEX—combines pentylenetetrazol and nicotinic acid in elixir and tablets for relief of tinnitus, as well as improving visual acuity dimmed by retinal arteriosclerosis, optic neuritis and borderline cases of macular degeneration.

PENTERGOT—our old standby to combat any vascular headache. It offers relief within the hour, even during nausea attack.

Storz Instrument Company, St. Louis Booths 111 through 114

Featured in the Storz Instrument display will be a complete selection of fine surgical instruments for eye, ear, nose and throat, bronchoscopic and nasal plastic surgeons. All new instruments developed during 1959 will be featured.

Of particular interest to the otologist will be sets of instruments for stapes mobilization and tympanoplasty of both American and European designs. In addition, the exhibit will feature a comparative display of the available observation tubes for use with the Zeiss surgical microscope as well as the available photographic equipment for this instrument.

Of importance to the ophthalmic surgeons will be a display of new equipment and instruments including the Troutman cataract extraction pump, new stainless steel cataract knives and keratomes, particularly a new very thin bladed, stainless steel cataract knife.

Demonstrations will be made of the observer's tube for the Zeiss surgical microscope and its adaptation to the Zeiss slit lamp.

The 1959 edition of the Eye Instrument Catalog will be available for distribution.

Surgical Mechanical Research, Inc., Los Angeles Booths 90B and 91

An efficiently arranged office which is

convenient in arrangement, economical in use of available space, and reasonable in cost, and which maintains its appearance of newness over the years.

Treatment units, wall, floor, and roll around models; treatment chairs; stools; cuspidors; suction and pressure apparatus; tables; lights; and other sundry treatment room equipment.

The SMR EAR STOPPER used extensively for the prevention of noise-induced hearing loss. Equally effective for occluding the ear canal during swimming. Questions relating to ear protection use, fitting, care, etc., may be discussed with the audiologist in attendance.

The Thermosector Company, Oak Park, Ill. Booth 31

The Thermosector, an electrosurgical unit expressly designed for eye, ear, nose and throat techniques in office and hospital, will be exhibited and demonstrated. You are invited to investigate the superior features of this device, which is preferred by leading hospitals, clinics and professional men.

See, also, the Dazor Floating Arm Magnifier Examining Lamps with no-glare fluorescent lighting on display at the Thermosector booth.

Titmus Optical Company, Inc., Petersburg, Va. Booth R-23

Uhlemann Optical Co., Chicago Booths 54 through 57

The Univis Lens Company, Dayton, Ohio Booths 39 and 40

Victory Optical Manufacturing Co., Newark, N. J. Booths 103 and 104

The latest exhibit booths of Victory Optical Manufacturing Company will feature "the styles of tomorrow today," and the latest colors in fashion eyewear. All Victory frames are precision crafted and ophthalmically correct, exemplifying the most desirable features of fine fashion eyewear. The best quality and the fastest service is the password in every department.

Vision-Ease Corporation, St. Cloud, Minn. Booth 60

Vision-Ease will display its full line of improved types of multifocals including the Cen-Cor lens and the Catarex temporary and permanent lens forms. Special emphasis will be given to absorptive tints, mechanical specifications for the entire line of semifinished multifocals, and an illustrated explanation of the various steps in the manufacture of a Vision-Ease D bifocal. Also on display will be a slide rule adaptation of "Ranges of Usable Clear Vision Chart for Multifocal Lenses," as said chart appears in The Guide to Occupational and Other Visual Needs by Clark Holmes.

Dr. Max M. von Stirne, Philadelphia Booth R-7

Walton Laboratories, Inc., Irvington, N. J. Booth R-14

Warner-Chilcott Laboratories, Morris Plains, N. J. Booth R-5

Welch Allyn, Inc., Skaneateles Falls, N. Y. Booth 17

White Laboratories, Inc., Kenilworth, N. J. Booth R-31

The White-Haines Optical Co., Columbus, Ohio Booths 21 and 22

The Williams & Wilkins Co., Baltimore Booth 36

A sparkling array of new ideas and new work includes the full color three-dimensional photography of the Bassett Stereoscopic Atlas of Human Anatomy (ask for demonstration), as well as the following books: Worth and Chavasse's Squint, by Lyle and Bridgeman; new edition of Kazanjian and Converse: Surgical Treatment of Facial Injuries; L. A. Peer: Transplantation of Tissues—Skin, Cornea, Fat, Nerves, Teeth, etc. (Vol. II); Gorin & Posner: Slit Lamp Gonios-

copy; Lyle & Lyle: Applied Physiology of the Eye; Schlaegel: Psychosomatic Ophthalmology; Stallard: Eye Surgery; Theodore & Schlossman: Ocular Allergy; Walsh: Clinical Neuro-Ophthalmology; Wolf et al.: Microscopic Anatomy of the Temporal Bone; Simpson et al.: A Synopsis of Otorhinolaryngology, and many others. And spotlighted as the most economical way of keeping abreast of the field is SURVEY OF OPHTHALMOLOGY, which reviews and evaluates new work appearing in the world literature.

Winthrop Laboratories, New York
Booth 117

Wyeth Laboratories, Philadelphia
Booth SF-708

Carl Zeiss, Inc., New York
Booths 74 and 75

Carl Zeiss, Oberkochen Fundus Camera with electronic flash and Carl Zeiss, Oberkochen Operation Microscope with Photo Attachment will be again featured in our exhibit. Furthermore, the well-known Carl Zeiss, Oberkochen Slit Lamps on instrument table and compound stage, as well as accessories such as anterior chamber depth micrometer, photo attachment and gonioscopic accessories will also be displayed. In addition, the Twin Lamp, Hand Lamp, Diagnostic Set, Vertex Refractionometer and various laboratory microscopes will also be shown.

Zenith Radio Corp., Hearing Aid Division, Chicago **Booths 93B and 94**

The Hearing Aid Division of Zenith Radio Corporation will exhibit its highest quality, precision built audiometer. Zenith's complete line of highest quality low-cost all-transistor hearing aids will also be on display, and Zenith representatives will be on hand to demonstrate them and to explain how any physician may test a Zenith hearing aid for thirty days at no cost or obligation.

Zylite Products Co., Inc., New York
Booth 48

Zylite Products Co., Inc., Long Island City, New York, manufacturers of fine ophthalmic frames, will present the latest styles from their 1959-60 line. Featured in these new styles are new construction and fitting techniques to provide superior fitting qualities.

On hand to greet members and guests of the Academy will be Herman Lieberman, Executive Vice-President, Charles Ladew, General Sales Manager, and Pete Foy, Jack Hinkes and Homer Millikan.

SECTION ON INSTRUCTION

SIXTY-FOURTH ANNUAL MEETING

American Academy of Ophthalmology and Otolaryngology

October 11-16, 1959

PALMER HOUSE

Chicago, Illinois

A. D. RUEDEMANN, M.D.
Secretary for Instruction — Ophthalmology

DEAN M. LIERLE, M.D.
Secretary for Instruction — Otolaryngology and Maxillofacial Surgery

The following condensed schedules of instruction courses are reprinted for the convenience of Fellows who have not yet placed orders for tickets.

Courses already sold out are so designated on the charts. Please do not request tickets for these courses.

For complete listing of course titles, instructors, and descriptive paragraphs about each subject, please refer to the May-June issue of the TRANSACTIONS.

An *individual* course is complete in one (1) period. A *continuous* course runs two (2) or more periods as indicated. It is not possible to purchase a ticket to only *part* of a continuous course. Some courses are repeated on different days allowing the subscriber to choose the time when he wishes to attend.

Ordering Instruction Tickets

Only members who have paid their 1959 dues may order instruction tickets in advance of the meeting. **Members should order tickets only for their own use.** *Candidates for fellowship in the Academy are not privileged to reserve tickets in advance.* After the session opens, no distinction between members, candidates and guests will be made in selling tickets.

At the end of this section is printed a colored sheet to be used when ordering tickets in advance. Specify preferences on this sheet and mail to the executive office. Careful attention to instructions will ensure the correct filling of your requests. *Since number of tickets for each course is limited, be sure to list second and third choices for each period in case first choice is already sold out. In every case, effort will be made to furnish first choices.*

If you are requesting registration in the continuous courses, please specify preferences for individual courses as substitutes in order to avoid disappointment should the continuous courses which you select be sold out when your order is received.

Each period (1 hour) of instruction costs $2.00. *Orders not accompanied by properly executed checks will not be filled.* Checks should be made payable to W. L. Benedict, M.D., and mailed to the Academy office, 15 Second St. S.W., Rochester, Minn.

All orders for tickets will be filled according to the postmark on the envelope containing the check. Telegrams will not be honored. Orders will not be accepted for presale after October 1; to ensure acceptance they should be mailed before September 29.

Acknowledgment of Advance Order

As soon as an advance order is filled, a post card, listing the courses that have been reserved for him, will be mailed to the subscriber. Please do not ask to change courses after your order has been filled. The post card is merely an assurance that your order has been filled; it is not necessary for registration at the Academy meeting.

Claiming Instruction Tickets

No tickets will be sent through the mails. Members who have ordered instruction course tickets will register at the *Advance Order Section* of the Registration Desk during the week of the Convention to secure registration badge, tickets, and all convention material.

Tickets will be on sale during the meeting at the Instruction Desk in the Registration Foyer and the Seventh Floor.

Refunds

If courses requested are not available and it is impossible to substitute, a refund will be granted. A blue refund card will be placed in the Advance Registration Envelope which is received at the time of registration. This may be presented at the Instruction Desk for payment.

In case of inability to attend the meeting after order has been filled, a refund will be granted if requested prior to October 9.

If you have ordered tickets in advance, at the time of registration take your registration card to the desk marked ADVANCE ORDERS. There you will be given an envelope containing badge, tickets and program which has been prepared ahead of time to facilitate your registration.

KEY TO DESIGNATION OF PERIODS

The periods will be designated with the following key: Select tickets for — Otolaryngology, forenoons, periods 1-2-3 — Ophthalmology, afternoons, periods 4-5-6

Day	(M)onday	(T)uesday	(W)ednesday	(Th)ursday
Period a.m.		1 2 3	1 2 3	1 2 3
Period p.m.	4 5 6	4 5 6	4 5 6	4 5 6

M-4	2:00 p.m. to 3:00 p.m.	W-4	2:00 p.m. to 3:00 p.m.
M-5	3:15 p.m. to 4:15 p.m.	W-5	3:15 p.m. to 4:15 p.m.
M-6	4:30 p.m. to 5:30 p.m.	W-6	4:30 p.m. to 5:30 p.m.
T-1	9:00 a.m. to 10:00 a.m.	Th-1	9:00 a.m. to 10:00 a.m.
T-2	10:15 a.m. to 11:15 a.m.	Th-2	10:15 a.m. to 11:15 a.m.
T-3	11:30 a.m. to 12:30 p.m.	Th-3	11:30 a.m. to 12:30 p.m.
T-4	2:00 p.m. to 3:00 p.m.	Th-4	2:00 p.m. to 3:00 p.m.
T-5	3:15 p.m. to 4:15 p.m.	Th-5	3:15 p.m. to 4:15 p.m.
T-6	4:30 p.m. to 5:30 p.m.	Th-6	4:30 p.m. to 5:30 p.m.
W-1	9:00 a.m. to 10:00 a.m.		
W-2	10:15 a.m. to 11:15 a.m.		
W-3	11:30 a.m. to 12:30 p.m.		

(Familiarity with this key will be helpful and will avoid confusion)

CHANGES IN INSTRUCTION COURSES

Ophthalmology

The following course has been added:

Course 236-A, Contact Lenses, will be given by Mr. Frederick Ridley, Moorfields Eye Hospital, London, England, on Wednesday afternoon at 2:00 o'clock in the Crystal Room.

The following course has been cancelled:

Course 104, Uveitis: Etiology and Treatment, by Moacyr E. Alvaro, M.D.

Otolaryngology

The following courses have been added:

Course 409-B, Surgery of the Stapes and Oval Window: Basic Considerations, by Richard J. Bellucci, M.D., New York, on Wednesday at 11:30 a.m. in the Crystal Room.

Course 449-A, Vascular Headaches, by Raymond L. Hilsinger, M.D., Cincinnati, on Tuesday at 11:30 a.m. in the Crystal Room.

The following courses have been cancelled:

Course 469, Use of Antibacterial Substances in Otolaryngology, by Perrin H. Long, M.D.

Course 524, Plastic Repair of Facial Injury: Basic Principles, by Sidney K. Wynn, M.D.

Other changes:

Dr. Seymour Brockman will assist Dr. Victor Goodhill in course 438, Stapes Mobilization: The Peribasal Monitored Technique, to be taught at 9:00 a.m. Tuesday and Thursday in Room 710.

Harold Jacox, M.D., New York, has been added to the faculty of course 304 and 305, Carcinoma of the Head and Neck: Diagnosis and Treatment.

The Following are Condensed Schedules of Courses Previously Described

CONTINUOUS COURSES — OPHTHALMOLOGY

COURSE	SPEAKERS	SUBJECT	PERIODS USED
1	Allen, J., et al.	Bacteriology & Infectious Diseases of the Eye	8 PERIODS M-4, M-5, T-4, T-5 W-4, W-5, Th-4, Th-5
2	Ascher	Aqueous Veins in Glaucoma	2 PERIODS M-4, M-5
3	Ballintine & Purnell	.....SOLD OUT.....	
4	Becker & Kinsey	Studies of Aqueous Flow	2 PERIODS T-4, T-5
5	Bedell	Ophthalmoscopy	3 PERIODS M-4, T-4, W-4
6	Berliner	Recent Advances in Biomicroscopy	3 PERIODS M-6, T-6, W-6
7	Boeder	Practical Optics	2 PERIODS Th-4, Th-5
8	Braley	.....SOLD OUT.....	
9	Brockhurst	.....SOLD OUT.....	
10	Brown et al.	Eye Muscles	8 PERIODS M-4, M-5, T-4, T-5 W-4, W-5, Th-4, Th-5
11	Byrnes	Ophthalmic Filters	2 PERIODS T-5, T-6
12	Callahan et al.	Ophthalmic Plastic Surgery: Fundamentals	8 PERIODS M-5, M-6, T-5, T-6 W-5, W-6, Th-5, Th-6
13	Clark, G.	Retinal Detachment	3 PERIODS M-4, T-4, W-4
14	Clark, W.	Surgery of Ocular Muscles	2 PERIODS Th-4, Th-5
15	Cooper	Principles of Muscle Surgery	2 PERIODS T-5, T-6
16 or 17	Copeland	Streak Retinoscopy	4 PERIODS M-4, M-5, T-4, T-5 or W-4, W-5, Th-4, Th-5
18	Costenbader	Muscle Problems	2 PERIODS M-4, M-5
19	Fonda & Sloan	Subnormal Vision	2 PERIODS T-4, T-5
20	Guibor	Orthoptics	3 PERIODS M-4, T-4, W-4
21	Harley	Lesions of 3rd, 4th & 6th Cranial Nerves	2 PERIODS W-5, W-6
22	Hollenhorst	Arterial Diseases as They Affect the Eye	2 PERIODS M-4, M-5
23	Hughes et al.	Ophthalmic Plastic Surgery: Advanced	8 PERIODS M-4, M-5, T-4, T-5 W-4, W-5, Th-4, Th-5
24	Iliff et al.	Ptosis	3 PERIODS Th-4, Th-5, Th-6
25	Jardon & Laubheimer	Fitting Ocular Prostheses	2 PERIODS W-4, W-5

CONTINUOUS COURSES — OPHTHALMOLOGY

COURSE	SPEAKERS	SUBJECT	PERIODS USED
26	Jones	Lacrimal Drainage Apparatus	2 PERIODS M-4, M-5
27	Knighton et al.	Practical Essentials of Glaucoma	9 PERIODS M-4, M-5, M-6, T-4 T-5, T-6, W-4, W-5, W-6
28	Leinfelder et al.	Diagnostic Aids in Neuro-ophthalmology	3 PERIODS Th-4, Th-5, Th-6
29	Lemoine et al.	Fundus Lesions	2 PERIODS M-5, M-6
30	Linksz	Physiology of Vision	2 PERIODS W-5, W-6
31	Masters et al.	Slit Lamp Biomicroscopy: Fundamentals	9 PERIODS M-4, M-5, M-6, T-4, T-5 T-6, W-4, W-5, W-6
32	McLean et al.	.....SOLD OUT.....	
33	Mullen et al.	Ocular Emergencies	3 PERIODS M-4, M-5, M-6
34	Parks & Albert	Eso-Deviations	4 PERIODS W-5, W-6, Th-5, Th-6
35	Pischel et al.	Retinal Detachment	4 PERIODS M-4, M-5, T-4, T-5
36	Posner & Gorin	Office Gonioscopy	2 PERIODS T-4, T-5
37	Prewitt	Diagnosis & Treatment of Ocular Allergy	2 PERIODS W-5, W-6
38	Regan, C., & Boeder	Refraction	4 PERIODS M-4, M-5, T-4, T-5
39	Regan, E.	Cataract Surgery	2 PERIODS M-4, M-5
40	Rizzuti	Tumors of Lids & Ocular Adnexa	2 PERIODS Th-4, Th-5
41	Roberts	Glaucoma	2 PERIODS M-4, M-5
42	Rolett	Gonioscopy	2 PERIODS W-4, W-5
43	Romaine	Ocular Motility Surgery	4 PERIODS M-4, M-5, T-4, T-5
44	Romaine	Refraction: Problems & Treatment	3 PERIODS M-6, T-6, W-6
45	Schepens et al.	Retinal Detachment	12 PERIODS M-4, M-5, M-6, T-4, T-5, T-6, W-4, W-5, W-6, Th-4, Th-5, Th-6
46	Schimek & Bousquet	Clinical Gonioscopy & Tonography	2 PERIODS W-4, W-5
47	Schlaegel & Hungerford	Uveitis	2 PERIODS Th-4, Th-5
48	Simpson & Costenbader	Probing of Nasolacrimal Duct in the Infant & Adult	2 PERIODS T-4, T-5
49	Sloane	School Vision Testing	2 PERIODS T-4, T-5
50	Sloane	Telescopic Lenses	2 PERIODS T-6, W-4

CONTINUOUS COURSES — OPHTHALMOLOGY

COURSE	SPEAKERS	SUBJECT	PERIODS USED
51	Gettes	Prescription of Prisms & Drugs Used in Refraction	2 PERIODS W-5, W-6
52	Stow & Moss	Diagnostic & Therapeutic Office Procedures	2 PERIODS M-5, M-6
53	Theobald et al.	Histopathology	12 PERIODS M-4, M-5, M-6, T-4, T-5, T-6, W-4, W-5, W-6, Th-4, Th-5, Th-6
54	Thorpe	Intraocular Foreign Bodies	2 PERIODS W-4, W-5
55	Thorpe et al.	.....SOLD OUT.....	
56	Thorpe & Allen, L.	Slit Lamp Gonioscopy	6 PERIODS M-4, M-5, M-6, T-4, T-5, T-6
57	Townes	Cataract Surgery	2 PERIODS W-5, W-6
58	Troutman et al.	Recent Advances in Ophthalmology	8 PERIODS M-5, M-6, T-5, T-6, W-5, W-6, Th-5, Th-6
59	Troutman	Enucleation Surgery	2 PERIODS T-5, T-6
60	Wheeler & Knapp	Concomitant Strabismus	4 PERIODS M-4, M-5, T-4, T-5
61	Home Study		10 PERIODS M-4, M-5, M-6, T-4, T-5 T-6, W-4, W-5, W-6, Th-4

SCHEDULE OF INDIVIDUAL COURSES — OPHTHALMOLOGY — Monday

Key M-4 — 2:00 p.m. to 3:00 p.m.

Course No.	SPEAKER	SUBJECT
104	Alvaro	..... CANCELLED .....
105	Alvis	Glaucoma Surgery: Long-Term End Results
119	Bonner	Vascular Retinopathy
124	Calhoun	Epithelization of Anterior Chamber
127	Cassady	Toxoplasmic Retinochoroiditis
129	Chamberlain	Vertical & Horizontal Components in Strabismus
131	Chandler	Glaucoma Surgery
145	DeVoe	Surgery of Trauma
146	Diskan	Eye Screening Programs in Schools
152	Everett	Retinal Detachment
155	Fernandez	Beta Radiation in Pterygium Surgery
160	Fralick	Principles of Lid Surgery
161	Frayer	Retained Lens Protein After Operation & Trauma
198	Leopold	Chemotherapy
243	Scarney	Slit Lamp Biomicroscopy
264	Veirs	External Dacryocystorhinostomy & Corrective Procedures for Epiphora

Key M-5 — 3:15 p.m. to 4:15 p.m.

Course No.	SPEAKER	SUBJECT
102	Aldrich	Emotional Problems
140	Cutler	Cataract: Methods of Extraction
144	Day	Medical Exophthalmos
147	Duke	Lesions of the Lids
148	Dunlap	Divergence Anomalies
156	Ferrer	Contact Lenses
167	Gipner	Recent Advances in Ophthalmic Surgery
208	MacLean	Cataracts: Surgical Management
218	Miller	Corneal Diseases
236	Reese	Cataract Extraction
239	Rundles	Streak Retinoscopy
247	Simpson	Hemorrhage Into the Vitreous
263	Veasey	Refraction Difficulties

Key M-6 — 4:30 p.m. to 5:30 p.m.

Course No.	SPEAKER	SUBJECT
103	Allen, H.	Aseptic Technique in Ophthalmology
114	Berens	Cyclodiathermy, Cycloelectrolysis, Iridencleisis & Cyclodialysis
123	Buxton	Total & Partial Keratectomies
125	Carroll	Optic Nerve Lesions
128	Castroviejo	Corneal Surgery
133	Cholst	Central Fields: Methods & Techniques
134	Cohoe	Special Reading Instruction for Partially Seeing
136	Coston	Inflammatory & Degenerative Disease of the Retina
138	Cunningham	Types of Head Pain
141	Daily	Biomicroscopy of Vitreous & Fundus Oculi
157	Fink, W.	Binocular Problems in Routine Refraction
166	Gifford	Local Anesthesia with Special Reference to Deep Motor Block
175	Hunt	Problems in Accommodation
176	Jacobson	Electroretinography
190	Kornzweig	Clinical Embryology
207	Luce	Wound Healing
228	Paton	Corneal Surgery
230	Perera	Retinal Detachment
232	Pico	Dacryocystorhinostomy
240	Rychener	The Lacrimal Apparatus
244	Scheie	Congenital Glaucoma: Surgical Procedures
250	Spaeth, E.	Plastic Surgery
258	Theodore	Ocular Therapeutics
266	Weisser	Repair of Corneal Injuries

SCHEDULE OF INDIVIDUAL COURSES — OPHTHALMOLOGY — Tuesday

Key T-4 — 2:00 p.m. to 3:00 p.m.

Course No.	SPEAKER	SUBJECT
104	Alvaro	..... CANCELLED .....
107	Andrew	Eye Diseases in Children
110	Atkinson	Advances in Anesthesia
124	Calhoun	Epithelization of Anterior Chamber
126	Cassady	Dacryocystitis & Lacrimal Drainage
140	Cutler	Cataract: Methods of Extraction
151	Egan	Cross Cylinder: Application & Theory
162	Fread	Ideal Refraction Equipment
163	Fry	Inflammatory & Degenerative Lesions at Posterior Pole of Eye
195	Leinfelder	Perimetry & Use of Tangent Screen
199	Lepard	Eye Diseases Common to Children
221	Naquin	Dislocation of the Lens
238	Ruedemann	Surgery of Vertical Muscles
249	Solanes	Surgery of Ocular Cysticercus
251	Spaeth, E.	Complicated Ptosis: Selection of Operation
254	Sugar	Classifications of Glaucoma
259	Theodore	External Diseases & Allergy
270	Wood	Macular Lesions

Key T-5 — 3:15 p.m. to 4:15 p.m.

Course No.	SPEAKER	SUBJECT
112	Bannon	Aniseikonia
115	Berens	Ophthalmic Surgery: Recent Trends
143	Davis	Sutures in Cataract Surgery
148	Dunlap	Divergence Anomalies
154	Falls	Clinical Manifestations of Constitutional Syndromes Involving the Head & Neck
164	Gartner	Fundus Diseases
185	Kennedy	Ocular Manifestations of Systemic Diseases
191	Kronenberg	Practical Ocular Therapeutics
203	Lloyd	Fundus Lesions of the Senile Eye
244	Scheie	Congenital Glaucoma: Surgical Procedures
248	Smith	Fractures of the Orbit
252	Spaeth, P., & Carmichael	Ocular Tumors
261	Uihlein	Neuralgias of the Head

Key T-6 — 4:30 p.m. to 5:30 p.m.

Course No.	SPEAKER	SUBJECT
106	Amenabar	Retinal Detachment
132	Chandler	Cataract Surgery
141	Daily	Biomicroscopy of Vitreous & Fundus Oculi
158	Fink, W.	Vertical Muscle Surgery
165	Gemeray	External Diseases
167	Gipner	Recent Advances in Ophthalmic Surgery
168	Haas	Congenital Glaucoma
186	Kestenbaum	Reading Aids for Low Vision
200	Levy	Practical Uses of Contact Lenses
205	Long	Retinoblastoma & the Pseudoretinoblastomas
206	Lubkin	Psychosomatic Aspects of Ophthalmology
209	Mangold	Proper Fitting of Glasses
211	Mann, W.	Functional Visual Impairment
214	McGraw	Contact Lenses
216	Merriam	Ocular Radiotherapy
219	Morrison	Glaucoma: Office Management
230	Perera	Retinal Detachment
234	Pischel	Use of Light Coagulation Machine
241	Salleras	Corneal Surgery
242	Sarrail	Lid Surgery
243	Scarney	Slit Lamp Biomicroscopy
245	Schlossman	Pleoptics
255	Sutliff	Practical Fitting of Contacts

SCHEDULE OF INDIVIDUAL COURSES — OPHTHALMOLOGY — Wednesday

Key W-4 — 2:00 p.m. to 3:00 p.m.

Course No.	SPEAKER	SUBJECT
111	Bannon	Practical Aspects of Multifocal Corrections
121	Breinin	Electromyography
126	Cassady	Dacryocystitis & Lacrimal Drainage
139	Cusick	Ptosis Surgery
145	DeVoe	Surgery of Trauma
149	Dunlap	Accommodative Squint
159	Fox	Senile Entropion & Ectropion
169	Hague	Irradiation Therapy
171	Hedges	Neuralgias of the Head
172	Henderson	Intracranial Arterial Aneurysms
174	Hill, H.	Cataract Surgery
177	Jaeckle	Nonstrabismic Abnormalities of Binocular Vision
178	Jampolsky	Ocular Divergence
179	Jobe	Ophthalmic Instruments
187	King	Lamellar Corneal Transplantation
195	Leinfelder	Perimetry & Use of Tangent Screen
204	Lloyd	Diseases of the Cornea
210	Mann, M.	Hypertensive Vascular Changes in the Fundus
233	Pino	Aids to the Ophthalmologist in Office Practice
236-A	Ridley	Contact Lenses
253	Steffensen	Senile Macular Degeneration
267	Wendland	Magnetic Intraocular Foreign Bodies
268	Weston	Astigmatism

Key W-5 — 3:15 p.m. to 4:15 p.m.

Course No.	SPEAKER	SUBJECT
101	Aebli	End Results of Muscle Surgery
113	Belmont	Refraction
116	Berke	Ptosis
130	Chamlin	Perimetry
153	Falls	Ocular Geriatrics
180	Johnson	Ptosis
183	Katz, D.	Ophthalmic Anatomy
186	Kestenbaum	Reading Aids for Low Vision
189	Klien	Clinical Pathology of the Retina
193	Lassiter	Pathology of Ophthalmoscopically Visible Lesions
194	Leahey	Corneal Transplantation
196	Lennon	Angle Closure Glaucoma
214	McGraw	.....SOLD OUT.....
215	McGuire	Cataract
229	Paulson	Lighting for Comfortable & Accurate Seeing
231	Pfeiffer & Jones, I.	Roentgenography of Eye & Orbit
237	Rucker	Paralysis of the Ocular Motor Nerves
265	Weingeist	Lacrimal Sac Surgery

Key W-6 — 4:30 p.m. to 5:30 p.m.

Course No.	SPEAKER	SUBJECT
108	Asbury	Practical Genetics in Everyday Office Practice
109	Ascher	Cyclodialysis
122	Brown	Fever Therapy in the Light of Recent Drugs
170	Halberg	Tear Formation
173	Hilding	Mechanics of Vitreous Motion
181	Joy	Chronic Glaucoma
182	Kasper	Dacryocystorhinostomy
184	Katz, I. H.	Common Eye Diseases of Dogs & Their Therapy
191	Kronenberg	Practical Ocular Therapeutics
192	Kronfeld	Present Trends in Ocular Pharmacology
197	Leopold	Advances in Ophthalmic Therapy
201	Lewis	Mechanical Visual Aids
213	Marshall	Chronic Infections of the Lids
219	Morrison	Glaucoma: Office Management
220	Murrah	Subnormal Vision
223	Newell	Radioactive Isotopes
225	Ogle	Stereopsis
246	Shipman	Scleral Resection
256	Tait	Heterophoric Asthenopia
257	Tassman	Eye Involvement in Systemic Diseases
260	Trent	Progress in Ophthalmology
261	Uihlein	Neuralgias of the Head
262	Vail	Senile Cataract

SCHEDULE OF INDIVIDUAL COURSES — OPHTHALMOLOGY — Thursday

Key Th-4 — 2:00 p.m. to 3:00 p.m.

Course No.	SPEAKER	SUBJECT
116	Berke	Ptosis
117	Block	Office Practice of Ophthalmology
118	Bonaccolto	Enucleation Techniques
120	Breakey	Rehabilitation in Ophthalmology
135	Cohen	Eye Problems in Community Health
137	Cowen	Pool Gonioscopy
142	Davidson	Surgical Instruments
188	King	Transplantation of Preserved Ocular Tissues
202	Linn	Evaluation of Patient for Glaucoma Operation
212	Marks	Electrical Currents Used in Ophthalmology
217	Meyer	Glaucoma: Surgical Treatment
224	Newell	Refinements in Ophthalmic Surgery
226	Ogle	Binocular Oculomotor Coordination & Imbalances
227	Olson	Iritis, Iridocyclitis, Keratitis
235	Post	Refinements of Refraction
269	Wise	Retinal Vascular Disease

Key Th-5 — 3:15 p.m. to 4:15 p.m.

Course No.	SPEAKER	SUBJECT
150	Edwards	Abnormal Effects of Prescribed Lenses on Extrinsic Muscles
222	Nethercut	Chorioretinopathies

CONTINUOUS COURSES AND PANEL DISCUSSIONS
OTOLARYNGOLOGY

COURSE	SPEAKER	SUBJECT	PERIODS
301	Anderson	Rhinoplasty: Practical Considerations	2 PERIODS T-1, T-2
302	Blumenthal	Ocular Conditions Associated with Otolaryngology	2 PERIODS Th-2, Th-3
303	Brewer & Briess	Head & Neck Symptoms Associated with Laryngeal Microtrauma	2 PERIODS T-2, T-3
304 or 305	Conley & Jacox	Carcinoma of Head & Neck	2 PERIODS W-1, W-2 or Th-1, Th-2
306	Converse	Principles of Nasal Plastic Surgery—Basic	2 PERIODS T-2, T-3
307	Converse	Principles of Nasal Plastic Surgery—Advanced	2 PERIODS Th-2, Th-3
308 or 309	Daly & Friedman	Cancer of Head & Neck	2 PERIODS T-1, T-2 or W-1, W-2
310	Fox & Gloria	Noise in Industry	2 PERIODS T-2, T-3
311 or 312	Froeschels & Beebe	Speech & Voice Therapy	2 PERIODS T-1, T-2 or W-2, W-3
313	Godlowski	I. Physiopathology of Endocrine System II. Enzymatic Mechanism of Allergy	2 PERIODS T-2, T-3
314	Godlowski	Endocrinopathies	2 PERIODS Th-2, Th-3
315	Guilford & Wright	.....SOLD OUT.....	
316 or 317	Hansel	Allergy & Medical Otolaryngology	2 PERIODS W-1, W-2 or Th-1, Th-2
318	Harbert	Clinical Audiology	2 PERIODS T-1, T-2
319 or 320	Hardy & Pauls	Clinical Audiology for Young Children	2 PERIODS T-2, T-3 or W-2, W-3
321	Hilding	Physiology of Hearing	2 PERIODS Th-1, Th-2
322	House, H. & House, W.	Surgery for Chronic Ear Disease & the Concept of Tympanoplasty	2 PERIODS W-1, W-2
323	Kazanjian et al.	Traumatic Injuries of Face	2 PERIODS W-2, W-3
324	Kelemen	Stapes Mobilization & Tympanoplasty	2 PERIODS Th-2, Th-3
325 or 326	Lathrop et al.	Otological Problems	2 PERIODS T-1, T-2 or W-1, W-2
327	Lawrence	Acoustic Principles in Middle Ear Surgery	2 PERIODS W-2, W-3
328	Lindsay	Deafness & Dizziness of Vascular Origin	2 PERIODS T-2, T-3
329	Semenov	Ear, Nose & Throat Therapeutics	2 PERIODS W-1, W-2
330 or 331	Simonton et al.	What the Otologist Should Know About Hearing Aids	2 PERIODS T-2, T-3 or W-2, W-3
332	Walsh	What Can Be Done for Deafness	2 PERIODS Th-2, Th-3

SCHEDULE OF INDIVIDUAL COURSES — OTOLARYNGOLOGY — Tuesday

Key T-1 — 9:00 a.m. to 10:00 a.m.

Course No.	SPEAKER	SUBJECT
403	Andrews	Bronchial Function Testing
411	Bordley	Deafness in the Infant & Preschool Child
413	Brewer & Briess	Laryngeal Anatomy & Phonatory Laryngeal Physiology
416	Clerf	Causes of Hoarseness: Treatment
419	Compere	Radiologic Examination of Mastoid, Middle Ear, & Eustachian Tube
424	Devine	Total Laryngectomy
427	Farrior, J. B.	Stapes Operability in 3-D
431	Fishbein	Medical Writing
435	Furstenberg	Management of Nasal Obstruction
438	Goodhill & Brockman	Stapes Mobilization: Peribasal Monitored Technique
442	Guilford & Wright	Controlled Healing of Mastoid & Fenestration Cavities
448	Harrill	Cancer of the Maxillary Sinus
454	Jesberg	Benign Conditions of the Throat
461	Kos	Stapes Mobilization
468	Loch	Septum Deviations
470	Lore	Vascular Surgery in the Head & Neck
504	Seltzer	Plastic Surgery of the Nose: New Instruments
508	Sisson	Head & Neck Surgery
520	Wallner	An Operation for Closure of Oroantral Fistula

Key T-2 — 10:15 a.m. to 11:15 a.m.

Course No.	SPEAKER	SUBJECT
428	Farrior, J. B.	Tympanoplasty in 3-D
434	Fowler	Facial Paralysis & Tics
439	Gorney	Esophageal Strictures
455	Jordan, L.	Recent Nasal Fractures: Management
460	Kirchner	Facial Bone Injuries
466	Lewis	Reactions to Drugs & Antibiotics
475	McNally	Labyrinthine Tests
482	Pastore	The Throat: Nonsurgical Problems
490	Reed	Neck Dissection
494	Roberts	Neurovascular Dysfunctions of the Eighth Nerve
506	Shambaugh	Surgical Applications of the Mechanics of the Middle Ear
515	Taylor	Esophageal Disease: Diagnosis & Management

Key T-3 — 11:30 a.m. to 12:30 p.m.

Course No.	SPEAKER	SUBJECT
410	Bolotow	Rhinoplasty: Recent Advances
417	Cocke	Salivary Gland Tumors: Management
421	Coyle	Radiation Therapy of Head & Neck
440	Grandon	Plastic Surgical Procedures for the Otolaryngologist
443	Hale	Fractures of the Jaws: Diagnosis & Treatment
447	Harkins	Routine Office Management of Allergic Patients
449-A	Hilsinger	Vascular Headaches
456	Jordan, R.	Meniere's Disease: Diagnosis & Treatment
463	Lemon	Serous Otitis Media in Children
465	Lepper	Antibiotics in Otolaryngology
476	Meltzer	Mastoid Cavity
478	Myers	Stapes Mobilization
481	O'Neil	Aerosol Therapy
483	Pearlman	Certain Aspects of Aging in Ear, Nose & Throat Regions
492	Rinkel	The Nature of Food Allergy
501	Schuknecht	Oval Window Prostheses in the Management of Otosclerosis
521	Weaver	Tumors of the Face: Management

SCHEDULE OF INDIVIDUAL COURSES — OTOLARYNGOLOGY — Wednesday

Key W-1 — 9:00 a.m. to 10:00 a.m.

Course No.	SPEAKER	SUBJECT
401	Alfaro	Fullness in the Ear: Differential Diagnosis
405	Armstrong	Use of Vinyl Tubing in Treatment of Chronic Secretory Otitis Media
412	Bradley	Practical Office Speech Audiometry
422	Crispell	Otolaryngologic Allergy in Children
429	Farrior, R.	A Method of Otoplasty
437	Goodale	Rationale of Surgery of Frontal Sinus
452	Jackson	Peroral Endoscopy & Endoscopic Photography
461	Kos	Stapes Mobilization
469	Long	..... CANCELLED .....
472	Magielski	Trauma of the Larynx & Trachea
474	McLaurin	The Child Without Speech: Differential Diagnosis & Treatment
477	Myers	Surgery of Chronic Otitis Media & Mastoiditis
489	Rawlins	Corticosteroids in Otolaryngology
491	Reger	Practical Office Audiometry
503	Sellers	Dizziness: Its Cure or Relief
514	Tabb	Surgical Approaches to Nasopharynx
522	Woodman	Glottic Obstruction

Key W-2 — 10:15 a.m. to 11:15 a.m.

Course No.	SPEAKER	SUBJECT
420	Corgill	Radical Hypopharyngeal Surgery Combined with Neck Dissection
433	Folbre	Discarding Old Ideas in Otolaryngology
445	Hallberg	Sudden Deafness
457	Juers	Perforations & Hearing Conservation Surgery
459	Kinney	Hearing in Children: Newer Concepts
461-A	Lake	Secretory Otitis Media in Children
467	Littwin	Rhinophyma
473	Maxwell	Diseases of Salivary Glands: Differential Diagnosis
484	Perlman	Fluid in Middle Ear: Etiology & Management
486	Pressman & Berman	Cysts of the Neck
495	Ronis	Chronic Sinusitis: Diagnosis & Treatment
505	Senturia & Adler	Middle Ear Effusions

Key W-3 — 11:30 a.m. to 12:30 p.m.

Course No.	SPEAKER	SUBJECT
402	Altmann & Waltner	Treatment of Meniere's Disease with Ultrasonic Waves
406	Arnold	Radiographic Diagnosis of Temporal Bone Lesions
409-A	Bell	Correction of Outstanding Ears
409-B	Bellucci	Surgery of Stapes and Oval Window
414	Brodnitz	Rehabilitation of Voice & Speech
415	Canfield	Speech Audiometry
418	Cody	Eustachian Tube
432	Fitz-Hugh & McLean	Salivary Glands: Common Disorders
441	Guggenheim	Technique & Pitfalls of Adenoidectomy
444	Hale	Cysts of the Jaws & Mouth: Diagnosis & Treatment
458	Kemler	Diagnostic & Therapeutic Aids in ENT Practice
462	Lederer	Diagnostic & Therapeutic Pitfalls in ENT Practice
464	Lempert	Temporal Bone Surgery: Pitfalls & Problems
471	Lynch	Suspension Laryngoscopy & Intralaryngeal Surgery
479	Ogura & Som	Conservation of Laryngeal Function in Cancer of Larynx
499	Scheldrup	Surgical Anatomy of the Neck
507	Shea	.....SOLD OUT.....
511	Sooy	Surgical Anatomy of Stapes Mobilization
524	Wynn	..... CANCELLED .....

SECTION ON INSTRUCTION

ADVANCE ORDER SHEET

All courses cost $2.00 for each period (one hour). Follow instructions explicitly and check for errors in listing before mailing.

Orders will not be accepted for presale after October 1. To ensure acceptance they should be mailed before September 29 to

WILLIAM L. BENEDICT, M.D., *Executive Secretary-Treasurer*
American Academy of Ophthalmology and Otolaryngology
15 Second Street S.W., Rochester, Minnesota

Academy Candidates and Guests May Purchase Tickets ONLY at Instruction Desk in Registration Foyer

(Over)

ADVANCE ORDER SHEET

ORDERS FILLED ONLY IF CURRENT DUES ARE PAID

NO REFUNDS WILL BE MADE AFTER OCTOBER 10

(Type or Print) Last Name First Name Middle Initial

Office Address

City Zone State

Days to be Present

- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☐ Thursday

Total Amount Enclosed $_____

SELECTION OF COURSES ON REVERSE SIDE OF THIS BLANK

RECAPITULATION OF GENERAL INSTRUCTIONS

1. Monday, Tuesday, Wednesday, and Thursday are represented by the letters M, T, W, Th. The first period in the morning is represented by figure 1, second period by figure 2 and third period by figure 3. The first period in the afternoon is represented by figure 4, second period by figure 5, and third period by figure 6. All courses in otolaryngology and maxillofacial surgery are presented in the mornings. All courses in ophthalmology are presented in the afternoons.

2. Reservation of instruction tickets in advance of the meeting will be made ONLY for MEMBERS whose 1959 dues have been paid. ACADEMY CANDIDATES AND GUESTS MAY MAKE SELECTION OF COURSES *ONLY* AT THE GENERAL REGISTRATION DESK IN CHICAGO.

3. Make check payable to W. L. Benedict, M.D.

4. Mail order promptly to ensure reservation of first choices. If necessary, an attempt will be made to rearrange schedule to include "first choices."

(Over)

SELECTION OF COURSES

PERIOD		FIRST CHOICE		SECOND CHOICE		THIRD CHOICE	
		Course No.	Lecturer	Course No.	Lecturer	Course No.	Lecturer
MON.	4						
P.M.	5						
	6						
TUES.	1						
A.M.	2						
	3						
P.M.	4						
	5						
	6						
WED.	1						
A.M.	2						
	3						
P.M.	4						
	5						
	6						
THURS.	1						
A.M.	2						
	3						
P.M.	4						
	5						
	6						

SCHEDULE OF INDIVIDUAL COURSES — OTOLARYNGOLOGY — Thursday

Key Th-1 — 9:00 a.m. to 10:00 a.m.

Course No.	SPEAKER	SUBJECT
401	Alfaro	Fullness in the Ear: Differential Diagnosis
404	Anthony & Fisher	Hemorrhage of Nose & Throat: Medical & Surgical Treatment
407	Atkins	Diseases of Trachea: Diagnosis & Management
408	Baron	Interesting Problems in Otolaryngology: Management
423	Daly & Cardona	Corrosive Esophagitis: Recent Advances in Management
438	Goodhill & Brockman	Stapes Mobilization: Peribasal Monitored Technique
442	Guilford & Wright	Controlled Healing of Mastoid & Fenestration Cavities
449	Henner	Functional Surgery of Middle Ear
450	Hough	Anatomic Variations in Middle Ear
452	Jackson	Peroral Endoscopy & Endoscopic Photography
461-A	Lake	Secretory Otitis Media in Children
468	Loch	Septum Deviations
496	Rosen	Surgical Anatomy of the Vestibule with Reference to the Stapedial Footplate
497	Ryan	Headache: Differential Diagnosis & Treatment
498	Saunders	Oral Lesions: Treatment & Clinical-Pathologic Correlation
500	Schuknecht	Technique for Removal & Preparation of Temporal Bones

Key Th-2 — 10:15 a.m. to 11:15 a.m.

Course No.	SPEAKER	SUBJECT
409	Becker	Plastic Surgery of Protruding Ears
426	Dickinson	Saddle Nose
436	Glorig	The Otolaryngologist & & Hearing Aid Selection
453	Jerger	Auditory Tests in Diagnosis
487	Proctor	Tympanoplasty
502	Sellers	Office Practice of Otolaryngology
509	Skolnik	Head & Neck Surgery: Errors & Safeguards
512	Spector	Dizziness: Differential Diagnosis
514-A	Tato	Speech Audiometry: New Developments
516	Tremble	Practical Therapeutics in Office Practice
518	Van Alyea	Sinusitis: Modern Trends in Management

Key Th-3 — 11:30 a.m. to 12:30 p.m.

Course No.	SPEAKER	SUBJECT
409-A	Bell	Correction of Outstanding Ears
425	DeWeese	The Problem of the Dizzy Patient
430	Farrior, R.	Cancer of the Head & Neck
446	Hallberg	Severe Nosebleed
451	House, H.	Stapes Mobilization Procedure
462	Lederer	Diagnostic & Therapeutic Pitfalls in ENT Practice
480	Ogura	Radical Neck Dissection & Laryngeal Carcinoma
488	Rabbett	Submucous Resection of the Nasal Septum
493	Rinkel	Specific Diagnosis in Allergy: A. Foods, B. Inhalants
510	Soboroff	Intranasal Tumors: Diagnosis & Surgical Management
513	Sullivan & Smith, J. B.	Facial Palsies & Their Treatment
517	Turnbull	Carcinoma of Paranasal Sinuses & Nasal Cavities
519	Wallner	Diseases of Larynx: Kodachrome Clinic
523	Woodruff	Epistaxis & Its Management

AWARD TO DR. WENDELL HUGHES

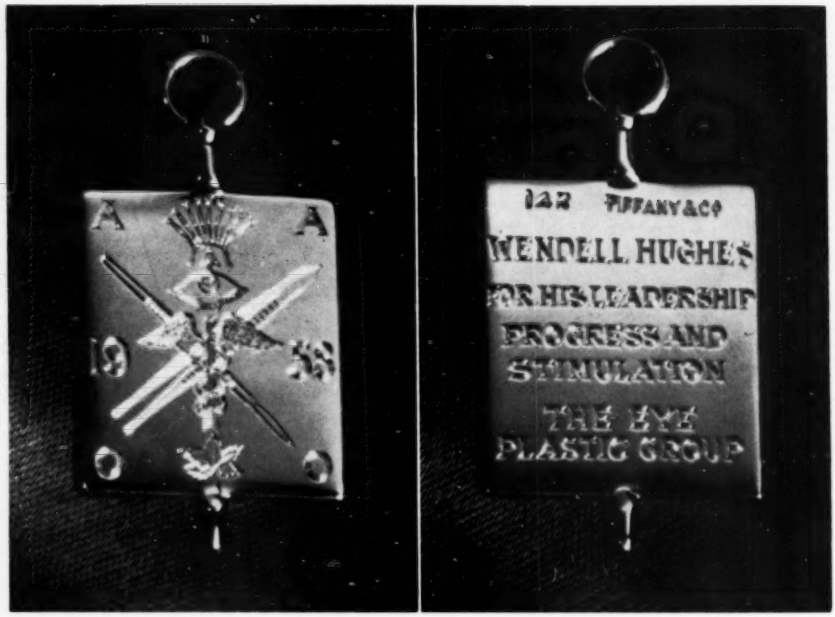


FIG. 1—(Left) Key awarded to Dr. Wendell Hughes by the Ophthalmic Plastic Surgery faculty of 1958, including Dr. Crowell Beard, Dr. Peter Ballen, Dr. Alston Callahan, Dr. J. Gordon Cole, Dr. Sidney Fox, Dr. Joseph Hill, Dr. Dean Hartman, Dr. Charles Iliff, Dr. Ira Jones, Dr. Merrill Reeh, Dr. Byron Smith, Dr. Edmund Spaeth, and Dr. Noel Stow. (Right) Reverse side of Key.

The members of the Ophthalmic Plastic Surgery Group, in the summer of 1958, proposed to present a key to Dr. Wendell Hughes in appreciation of his leadership, and with the sanction of the Council of the American Academy of Ophthalmology and Otolaryngology, a gold key was designed and fabricated. Presentation of the award was made at the opening of a symposium on Blepharoptosis, on the evening of October 14, in the Grand Ballroom of the Palmer House in Chicago.

The theme depicted by the design on the key is representative, in part, of the life of Dr. Hughes, his accomplishments, hobbies, and profession. The maple leaf, below the staff of the caduceus, is indicative of his birth in the Dominion of Canada. The eye behind the caduceus shows a central defect of the lower eyelid. The operation described by Dr. Hughes for the correction of such a deformity is among his many contributions to ophthalmic plastic surgery. The brow, above the eye, is shown as the headdress of an Indian chief, indicating his ability in leadership and organization. The crossed scalpel and forceps, overlying the caduceus, represent the instruments by which Dr. Hughes has achieved distinction and professional fame. The A in each of the upper corners signifies his admirable average in the achievement of previous awards. The shaft and eyelet, at the top of the key, represent his tennis racquet. [Dr. Hughes has stated that he would hesitate to be anywhere on earth without his tennis racquet.] The O's in the two lower corners of the key represent tennis balls. The A. A. O. O. in the corners of the

key stand for the *American Academy of Ophthalmology and Otolaryngology*.

The inscription, on the back of the key, "Wendell Hughes for his leadership, progress and stimulation," expresses the respect, admiration and sentiments of the members in the Ophthalmic Plastic Group of the Academy.

The instruction course in Ophthalmic Plastic Surgery in the Academy was instigated by Dr. John Wheeler following the First World War. For several years he conducted a one-hour course at the annual meeting. Later it was extended to two hours. During Dr. Hughes' residency at Bellevue Hospital, shortly after Dr. Charles May was replaced by Dr. Wheeler, he became interested in Dr. Wheeler's work. Through his stimulation, Dr. Hughes was well trained in ophthalmic plastic surgery. At the New York Eye and Ear Infirmary, they worked together harmoniously until the time of Dr. Wheeler's departure for the Eye Institute at Columbia Presbyterian Medical Center.

Early in the teaching career of Dr. Hughes at the Academy he conducted courses in eye muscle surgery and lacrimal surgery. Coincident to the increased responsibilities and failing health of Dr. Wheeler, it became incumbent on Dr. Hughes to give also the two hours of instruction in plastic surgery at the annual meeting. With the development of other ophthalmologists in the skill and knowledge of ocular plastic surgery, the course has now expanded into basic and advanced divisions, with a total of sixteen hours. A staff of fourteen lecturers now participate in the teaching of this interesting subject. One hour, individual courses covering various phases of plastic surgery are also given by some of the members of this group as well as other members of the Academy. At the Tuesday evening conference, during the annual meeting of the Academy, various phases of the subject are presented. Since the beginning of this open seminar, continued interest by the ophthalmologists, has demanded more and more space. The Grand Ballroom was required to accommodate the audience at the last meeting, October 1958. A program covering congenital malformations is scheduled for presentation at the meeting in October 1959.

It is our hope that through the expression of our sentiments and appreciation by the presentation of this key to a deserving leader, other similar awards to Academy leaders may be inspired. Our feeling is that recognition during the active phase of a man's life is more apropos than a testimonial recognition during or after his decline.

BYRON SMITH, M.D.

News - - - Notes

ASIA-PACIFIC ACADEMY OF OPHTHALMOLOGY

The Asia-Pacific Academy of Ophthalmology will meet in Manila, Oct. 10 to 13, 1960. The principal subject of this meeting will be "Blinding Diseases in Asia." Under this heading, cataract, glaucoma, diseases of the cornea, trachoma, and nutritional deficiencies of the eye will be discussed.

Ophthalmologists interested in presenting papers should contact Dr. William John Holmes, Secretary General, 1013 Bishop Street, Honolulu 13, Hawaii.

Those interested in attending the meeting may obtain further information from the Compass Travel Bureau, Inc., 55 West 42nd Street, New York 36.

ASSOCIATION FOR RESEARCH IN OPHTHALMOLOGY, INC.

The following dates for regional and national meetings of the Association for Research in Ophthalmology, Inc., have been announced. The bylaws of the Association require that all papers presented at the national meetings be published in the Supplements. Publication of papers from section meetings is optional.

Midsouthern Section Nov. 13, 14, 1959

Jesse Jones Library Bldg., Texas Medical Center, Houston, Texas.

Louis Girard, M.D., Chairman, Hermann Professional Bldg., Houston, Texas.

Southeastern Section Dec. 3, 4, 5, 1959

Medical College of Georgia, Augusta, Georgia.

John R. Fair, M.D., Chairman, Medical College of Georgia, Augusta, Georgia.

Midwinter National Meeting Dec. 3, 4, 5, 1959

Medical College of Georgia, Augusta, Georgia.

Lorand V. Johnson, M.D., Chairman, 10515 Carnegie Avenue, Cleveland 6, Ohio.

East Central Section Jan. 4, 1960

University of Michigan, Ann Arbor, Michigan.

Harold Falls, M.D., Chairman, University Hospital, Ann Arbor, Michigan.

Eastern Section Feb. 18, 1960

Wills Eye Hospital, Philadelphia, Pennsylvania.

Thomas R. Hedges, Jr., M.D., Chairman, 1711 Rittenhouse Square, Philadelphia 3, Pennsylvania.

Midwestern Section April 23, 24, 1960

Indiana University Medical Center, Indianapolis, Indiana.

Fred M. Wilson, M.D., Chairman, Indiana University Medical Center, Indianapolis, Indiana.

National Meeting June 12-17, 1960

Miami, Florida, Lorand V. Johnson, M.D., Chairman, 10515 Carnegie Avenue, Dec. 15, 1959.

SECTION ON LARYNGOLOGY, OTOLOGY AND RHINOLOGY, A. M. A.

Dr. Walter E. Heck, secretary for the Section on Laryngology, Otology and Rhinology, American Medical Association, has announced the election of the following officers of the Section for the coming year: Dr. Paul H. Holinger, chairman, 700 N. Michigan Ave., Chicago 11; Dr. Lawrence R. Boies, vice-chairman, University Hospital, Minneapolis 14; Dr. Walter E. Heck, secretary, Stanford Hospital, San Francisco 15; Dr. Gordon F. Harkness, delegate, 507-510 Putnam Bldg., Davenport, Iowa; Dr. Dean M. Lierle, alternate delegate, University Hospitals, Iowa City; Dr. Walter H. Maloney, representative to scientific exhibit, University Hospitals, 2065 Adelbert Road, Cleveland 6.

The next meeting of the Section on Laryngology, Otology and Rhinology, A. M. A., will be held in June 1960 at Miami Beach, Florida.

SECTION ON OPHTHALMOLOGY, A. M. A.

The Annual Scientific Session of the Section on Ophthalmology, American Medical Association, was held in Atlantic City, New Jersey, from June 10 to 12, 1959. The attendance was excellent. Dr. S. P. Meadows of London, England, and Dr. Paul C. Bucy of Chicago, Illinois, were Guests of Honor.

The following prizes and honors were awarded:

1. The Prize Medal in Ophthalmology was awarded to Dr. Francis Heed Adler for his many contributions to our specialty.

2. The $250 prize for the best exhibit was awarded to Dr. Gilbert Baum and Mr. Ivan Greenwood for their exhibit, "Application of Ultrasonic Locating Techniques to Ophthalmology."

3. The $250 prize was awarded to Dr. Thomas P. Kearns, Dr. Robert M. Salassa, Dr. Collin S. MacCarty, and Dr. James W. Kernohan for their paper, "Ocular Manifestations of Pituitary Tumor in Cushing's Syndrome," judged on the basis of presentation and originality.

The following officers were elected: Dr. Harold G. Scheie, chairman; Dr. Paul A. Chandler, vice-chairman; Dr. Henry F. Allen, secretary; and Dr. Frank W. Newell, representative to scientific exhibit.

DEAFNESS RESEARCH FOUNDATION

The Deafness Research Foundation, 250 Park Avenue, New York 17, has announced initial grants of $13,240 from Foundation funds for basic research in hearing and deafness.

The Foundation, established less than a year ago, is the only national voluntary health organization, founded and governed by laymen, devoted primarily to fundamental research in the causes, prevention and cure of deafness.

The Foundation's first grants, and their recipients are:

A grant of $4,400 to the Hearing and Communication Laboratory, Indiana University, Bloomington, Indiana, to support research on the fundamental relationships between the amount of noise exposure and the amount of permanent hearing loss, with particular reference to industrial and military personnel.

A grant of $3,840 to the Hearing and Speech Clinic of the Children's Hospital Society of Los Angeles for a project to examine the reliability of hearing evaluation in young children.

A grant of $5,000 to the College of Physicians and Surgeons, Columbia University, New York City, for two projects: a statistical study of the incidence, type and severity of hearing impairment at all ages in the population; and an investigation of the causes of congenital malformations of the ear, using animal embryos.

The Foundation will suppqrt additional research projects in universities, medical centers and scientific institutions as rapidly as circumstances permit. A number of other applications for grants are already under evaluation by a staff of leading scientists and physicians specializing in problems of hearing. The members of this group donate their services.

The United States Public Health Service estimates that between 15 and 20 million Americans have subnormal hearing. Referring to this statement, Dr. Merle Lawrence, of the Department of Otolaryngology at the University of Michigan, a spokesman for the Foundation said, "Despite this fact and the extensive research which has been and is presently being carried on, there is still a lack of basic knowledge of the underlying causes of many types of deafness, and there is urgent need for increased efforts to investigate the complex related problems.

"The Deafness Research Foundation offers support for promising research in many fields of inquiry where exploration has been limited. It is evident from the important results already obtained by researchers in this field that basic research in the relation of noise exposure to hearing loss, particularly in industrial plants, can be expected to reduce materially the incidence of occupational hearing disorders. Additional support is needed for research directed toward the measurement of individual tolerance to noise, estab-

lishment of safe levels of exposure, determination of the effect of changes in technology and the establishment of other damage-risk criteria."

Mrs. Hobart C. Ramsey, the Foundation's president, pointed out that, in addition to supporting fundamental research in hospitals and universities, the Foundation also acts as a clearing house for evaluating and spreading knowledge on the subject of deafness and informs the public of the value of hearing tests, early diagnosis of hearing loss, and methods of prevention and treatment. For example, Mrs. Ramsey said, many hard of hearing individuals are unaware of surgical procedures which can often restore hearing to practical levels in those afflicted with otosclerosis, a bone disease which prevents sound from reaching the sense organ.

Among the areas in which the Foundation plans to establish research programs are: the effects of high levels of environmental noise; the relationship of childhood diseases to deafness; the effects of air and space travel and underground and underwater conditions; "head noises" common in many types of deafness; Meniere's disease, with symptoms of dizzy spells and progressive deafness; and methods of early detection and treatment of hearing loss.

The Deafness Research Foundation's officers and directors include Leonard Kimball Firestone, director and honorary chairman; Charles R. Sligh, Jr., chairman of the board; and Charles Edison, former Governor of New Jersey.

The small staff is assisted by volunteer medical and research advisors and scientific consultants, selected for their special knowledge of the problems and particular areas in which further research is urgently needed.

THE NATIONAL COUNCIL TO COMBAT BLINDNESS

The National Council to Combat Blindness, Inc., has announced that the closing date for receipt of completed applications for FIGHT FOR SIGHT full-time research fellowships, grants-in-aid and summer student fellowships has been designated as January 1, 1960. This change of date was found necessary in order to facilitate the processing of the increased number of applications being filed with the organization for review by the Committee.

In general, notification to applicants for full-time research fellowships and grants-in-aid will go forward in mid-July and the commencement date for awards will continue to be August 1. Applicants for student fellowships will be notified in mid-May of the action taken by the Scientific Advisory Committee in order that they may make arrangements with their respective institutions to commence work in early summer.

Appropriate forms may be obtained by addressing Secretary, National Council to Combat Blindness, Inc., 41 West 57th Street, New York 19.

EYE STUDY CLUB

The Second meeting of the Eye Study Club was held at the Broadmoor Hotel, Colorado Springs, from March 29 through April 3, 1959. Twenty-three members and their wives were present.

The group generally agreed that glaucoma surveys should be limited in scope (covering a fixed group); educational in nature; not in any way promotional. It was agreed that the general practitioner needed more education in regard to glaucoma and particularly the proper use of the tonometer.

The group generally agreed that much greater stress should be placed on the contact lens. The possibility of designating certified refractionists in acceptable areas was discussed at length. This naturally brought up the subject of dispensing. Except for a few individuals who felt that dispensing approached rather close to a "business" viewpoint, the members were generally agreed that dispensing by or under the control of the ophthalmologist actually provided the patient with more benefits. Those members present who dispensed stated that they actually bent over backward to maintain the integrity of the doctor-patient relationship. Their arguments, while not completely convincing to all, were certainly accepted as being utterly sincere and honest.

Most of the members felt that chymotrypsin should be used only in selected cases and that certain reservations must be met before general use should be considered.

The group discussed miotics, miotics plus mydriasis (Neo-Synephrine, Epitrate), criteria for glaucoma surgery. Generally speaking, the group fell back on the tried and true criteria for glaucoma and utilized tonography occasionally. Tonography as an indicator for potential glaucoma cases was considered feasible only with familial incidence as an office procedure.

Steroids in ophthalmic therapy were discussed at length by every member present. In conclusion each member presented his treatment for "central serous retinopathy." The relation of steroids to generation of ulcers and ulcer-type personalities was reiterated. The over-all treatment of central serous disease revolved around reassurance, vitamin B_{12} injections, tranquilizers, tobacco withdrawal. The relationship of this disease to intelligent, hyperkinetic individuals liable to emotionalism associated with loss of vision, indicated that real care was required in therapy even though the bulk of patients achieved complete recovery. Bed rest was indicated by some, and over half the members present utilized steroids.

Finally, new members were elected, and it was voted that the 1960 meeting would be scheduled for Nassau, Bahamas.

RESEARCH IN OTOLARYNGOLOGY

The Third Annual Meeting on Research in Otolaryngology will convene at 9:00 a. m. on Saturday, October 10, at the University of Chicago Clinics, 950 East 59th Street. This year's program is in charge of Dr. William D. Neff, Department of Psychology, University of Chicago.

HEARING IMPAIRMENT IN CHILDREN

The Third Progress Report of the Graduate School of Public Health, University of Pittsburgh, 1956-58, contains the following report of research on hearing impairment in children:

A retrospective study of audiometric findings over an eight-year period of a school population in Reading, Pennsylvania, was done by Dr. Wishik and Dr. Kramm and was reported. Evidence derived from this study on case finding methods, audiometric techniques, association with academic retardation, and other factors pointed up the need for basic investigation. Under a grant of $30,080 a year from the Children's Bureau and $62,200 a year from the National Institutes of Health, an ambitious five-year project on hearing in children was launched jointly with the Subcommittee on Hearing in Children of the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology. This project is under the direction of Dr. Eldon Eagles, who also acts as Executive Director for the Academy Subcommittee. Several thousand children, ranging in age from 3 to 15 years, will be studied over a period of years to learn more about the hearing life history of a child population and to correlate audiometric findings, clinical otologic disease and findings, academic achievement, personality development, and other factors. Basic work on standardization of equipment and techniques constitutes an important part of the project.

POSITIONS AVAILABLE

WANTED—OTOLARYNGOLOGIST.

A young and well trained otolaryngologist is needed in Plainfield, New Jersey. Write for details to J. M.Wolff, M. D., 935 Park Avenue, Plainfield, New Jersey.

OPHTHALMOLOGIST, Board certified.

Bergen County, New Jersey, a fast-growing residential community of 600,-000; 15 minutes from New York City with its advantages for research, clinical work and medical meetings. Suburban living; good schools. Golf, hunting, fishing, surf bathing. Salary, commissions or partnership. Income depends on work done, $12,000 minimum. Send pertinent data and photograph to Raynold N. Berke, M. D., 430 Union Street, Hackensack, New Jersey.

WANTED—OTOLARYNGOLOGIST.

Board certified or qualified. Busy two man office and teaching opportunities. Immediate need for third associate; starting remuneration guaranteed; partnership after one year if compatible. For further information write Charles R. Taborsky, M.D., 1 South Pinckney Street, Madison 3, Wisconsin.

WANTED—E.E.N.T. specialist in Canadian western city, to take care of surplus busy practice. Guaranteed salary. Can be carried on as a separate private practice. Will consider a semi-retired specialist who does not care to do any major surgery. Applicant need not be certified. Write for details to M. S. Miller, M. D. 404 Medical Center, 8th Avenue and 8th Street, S. W., Calgary, Alberta.

Listings of positions available should be sent to W. L. Benedict, M.D., 15 Second Street S. W., Rochester, Minn., by the fifth of the month preceding publication. They should include (1) type of physician wanted (ophthalmologist or otolaryngologist: diplomate, resident, etc.) (2) type of position to be filled; and (3) whom to write for further information. Unless otherwise requested, listings will be published only once.

The Academy will handle no further correspondence beyond the listing and assume no responsibility. Neither does it endorse nor guarantee any of the published listings.

TEACHING AIDS

MANUALS

	PRICE
RETINAL DETACHMENT, H. Arruga, et al.	$1.00
OCULAR SURGERY, Conrad Berens and J. H. King	1.00
CATARACT TYPES, F. C. Cordes	1.00
SLIT LAMP BIOMICROSCOPY, E. Goar, et al.	1.00
DESCRIPTION OF THE ORBIT, McCotter, Fralick and Henderson	1.00
GLAUCOMA, Samuel J. Meyer	1.00
THE INTERPRETATION OF VISUAL FIELDS, C. W. Rucker	1.00
REFRACTION, Daniel Snydacker and Frank W. Newell	1.00
EXTRINSIC EYE MUSCLES, H. Saul Sugar	1.00
MICROBIOLOGY OF THE EYE, Ted Suie	1.00
PRINCIPLES OF OTOLARYNGOLOGIC PLASTIC SURGERY, Oscar Becker	1.00
VOCAL REHABILITATION, Friedrich S. Brodnitz	2.00
EMBRYOLOGY OF THE HEAD AND NECK IN RELATION TO THE PRACTICE OF OTOLARYNGOLOGY, Jack Davies	1.00
RADIOGRAPHIC ANATOMY OF THE TEMPORAL BONE, J. Brown Farrior	1.00
EXAMINATION OF THE LABYRINTH IN RELATION TO ITS PHYSIOLOGY AND NONSUPPURATIVE DISEASES, W. J. McNally and E. A. Stuart	1.00
NONSURGICAL COMPLICATIONS OF OTOLARYNGOLOGIC SURGERY, J. J. Pressman, et al.	1.00

MONOGRAPHS

HELPFUL HINTS FOR HANDLING THE HEARING HANDICAPPED, Gordon D. Hoople, et al.	$0.25
HEARING TESTS, Arthur L. Juers	0.25
PHYSIOLOGY OF THE LARYNX, J. J. Pressman and George Kelemen	.50
THE EMBRYOLOGY OF THE EAR, NOSE, AND THROAT, O. E. Van Alyea	0.25
STRABISMUS: A SYMPOSIUM, Kenneth C. Swan, et al.	0.50
REFRACTION DIFFICULTIES Clarence A. Veasey, Jr.	0.50

ABSTRACTS

Set contains outlines, briefs of instruction courses as presented at Academy meetings. Unbound.

Ophthalmology:	1957	$5.00
	1958	8.00
Otolaryngology:	1957	2.00
	1958	8.00

TRANSACTIONS

Subscription: Per year, bimonthly publication	$10.00
Single issue: Through 1955	0.50
1956 through 1959	2.00

BOUND VOLUMES

Atlas of Otolaryngic Pathology	$20.00
Tonometry—Tonography, Decennial Report (Bound) Ea.	3.00

FILMS — LANTERN SLIDES — FILM STRIPS

THE EMBRYOLOGY OF THE EYE, a motion picture in color with sound. Available on one reel or in two parts on two reels with metal containers and mailing case. Per Print	$200.00
176 Lantern Slides from above film, 2 × 2, in color	
Mounted in glass, with wooden filing box	125.00
Mounted in cardboard, with plastic and plywood filing box	75.00
Film Strips, from above film, 32 mm. Set of six (176 frames), in color, in metal containers	25.00
THE EMBRYOLOGY OF THE EAR, a motion picture in color with sound. On three reels with metal containers and mailing case. Per Print	500.00

SEND ORDER WITH REMITTANCE TO

W. L. BENEDICT, M.D., 15 SECOND STREET S.W., ROCHESTER, MINNESOTA

a new Solution for an old ocular problem

Prednefrin® S

OPHTHALMIC SOLUTION

Prednefrin S means new relief in sight—for patients with inflammatory and allergic disorders of the anterior segment. Prednefrin S provides potent anti-inflammatory action (0.2% prednisolone) plus the advantages of immediate and prolonged decongestant effect . . . in a lubricating, non-irritating, special solution—a solution which assures uniform concentrations, freedom from stinging or burning on instillation and freedom from irritation for as long as therapy continues. *Taken together,* the ingredients in Prednefrin S *work together* to safeguard sight—at the site.

The complete Prednefrin S formula: prednisolone alcohol 0.2%, and phenylephrine HCl 0.12% in a sterile, lubricating solution—for prompt control of inflammatory and allergic conditions of the eyelids, conjunctiva, cornea, sclera, uveal tract and following thermal or chemical burns.

DOSAGE: 1 to 2 drops two to four times daily. In initial 24-48 hours, the dosage may be increased safely to 2 drops every hour.

SUPPLY: In 5 cc. plastic dropper bottles—on prescription only.

Also Available . . . Prednefrin® Ophthalmic Suspension—whenever the repository effect of a "solution-like" suspension and less potent anti-inflammatory action are indicated in the inflammatory conditions.

ALLERGAN CORPORATION

Los Angeles 17, California